AIR CONDITIONING HEATING AND VENTILATING

SEPTEMBER, 1957—54th Year

Supersonic Gales Can be Created in Wind Tunnel for Testing Model Aircraft and Missiles

—

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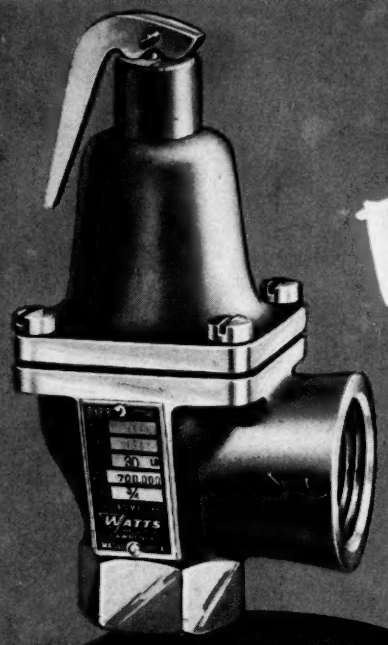

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Watts A.S.M.E. Rated Pressure Relief Valves No. 74A and 174A, 740 Series set top standards in engineering, quality construction, double-safe design with a wide range of capacities. Tested and proved by on the job performance! Compare and see for yourself.

V UV NB A.S.M.E.

JUDGE others by these standards!

DOUBLE-SAFE DESIGN: No mechanical guides — not diaphragm actuated.

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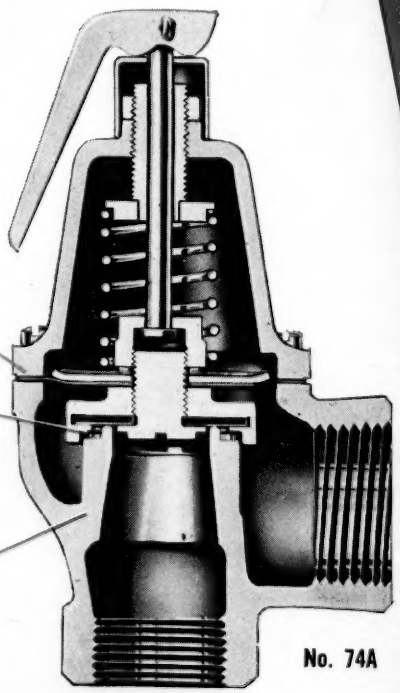
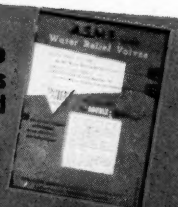


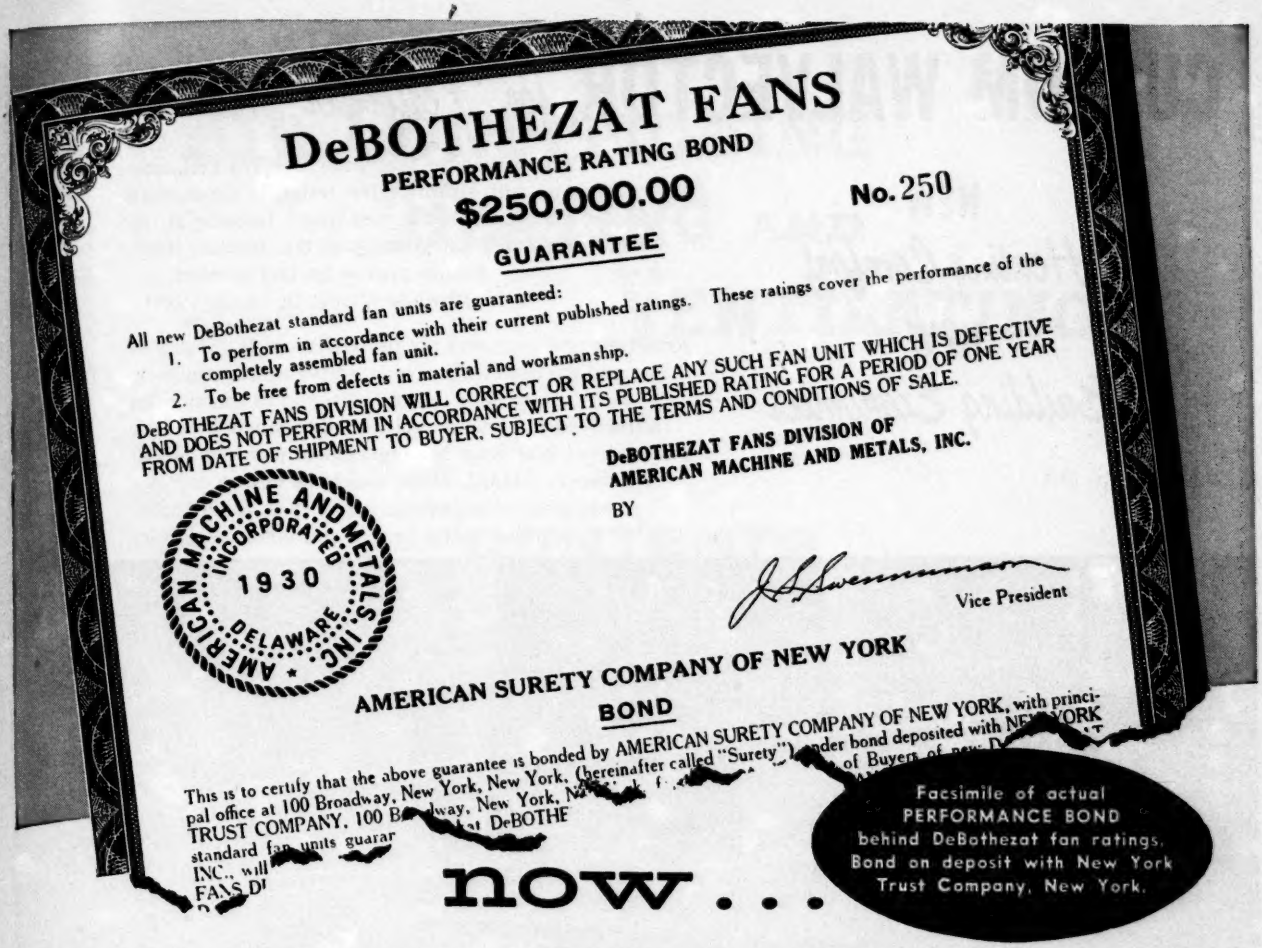
No. 74A

Watts No. 74A and 174A, 740 Series A.S.M.E. Rated Relief Valves are available in capacities from 500,000 BTU/HR to 14,370,000 BTU/HR with valve settings from 30 to 150 lbs. For complete information on sizes, pressure settings, and relief capacities, send for Folder F-ASME.



WATTS REGULATOR COMPANY LAWRENCE MASSACHUSETTS

30 years experience in designing and manufacturing pressure relief valves for water heating equipment.



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$250,000.00 No. 250

GUARANTEE

All new DeBothezat standard fan units are guaranteed:

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DeBOTHEZAT FANS DIVISION WILL CORRECT OR REPLACE ANY SUCH FAN UNIT WHICH IS DEFECTIVE AND DOES NOT PERFORM IN ACCORDANCE WITH ITS PUBLISHED RATING FOR A PERIOD OF ONE YEAR FROM DATE OF SHIPMENT TO BUYER, SUBJECT TO THE TERMS AND CONDITIONS OF SALE.

DeBOTHEZAT FANS DIVISION OF
AMERICAN MACHINE AND METALS, INC.

BY

Vice President

AMERICAN MACHINE AND METALS INC. INCORPORATED 1930 DELAWARE

AMERICAN SURETY COMPANY OF NEW YORK

BOND

This is to certify that the above guarantee is bonded by AMERICAN SURETY COMPANY OF NEW YORK, with principal office at 100 Broadway, New York, New York, (hereinafter called "Surety") under bond deposited with NEW YORK TRUST COMPANY, 100 Broadway, New York, New York, for the benefit of Buyers of new DeBOTHEZAT standard fan units guaranteed by AMERICAN MACHINE AND METALS, INC., will ... FANS DIVISION ...

Facsimile of actual PERFORMANCE BOND behind DeBothezat fan ratings. Bond on deposit with New York Trust Company, New York.

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All DeBothezat fan performance ratings are *bonded* by the American Surety Company and this bond is on deposit with New York Trust Company, New York.

This is your positive assurance that a DeBothezat rating is what the *complete* fan unit actually puts out.

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Partial view of DeBothezat's own advanced testing facilities. Accurate wind tunnel tests are made here in accordance with the appropriate NAFM plate . . . conform to U. S. Dept. of Commerce Standard 178-51.

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A DIVISION OF

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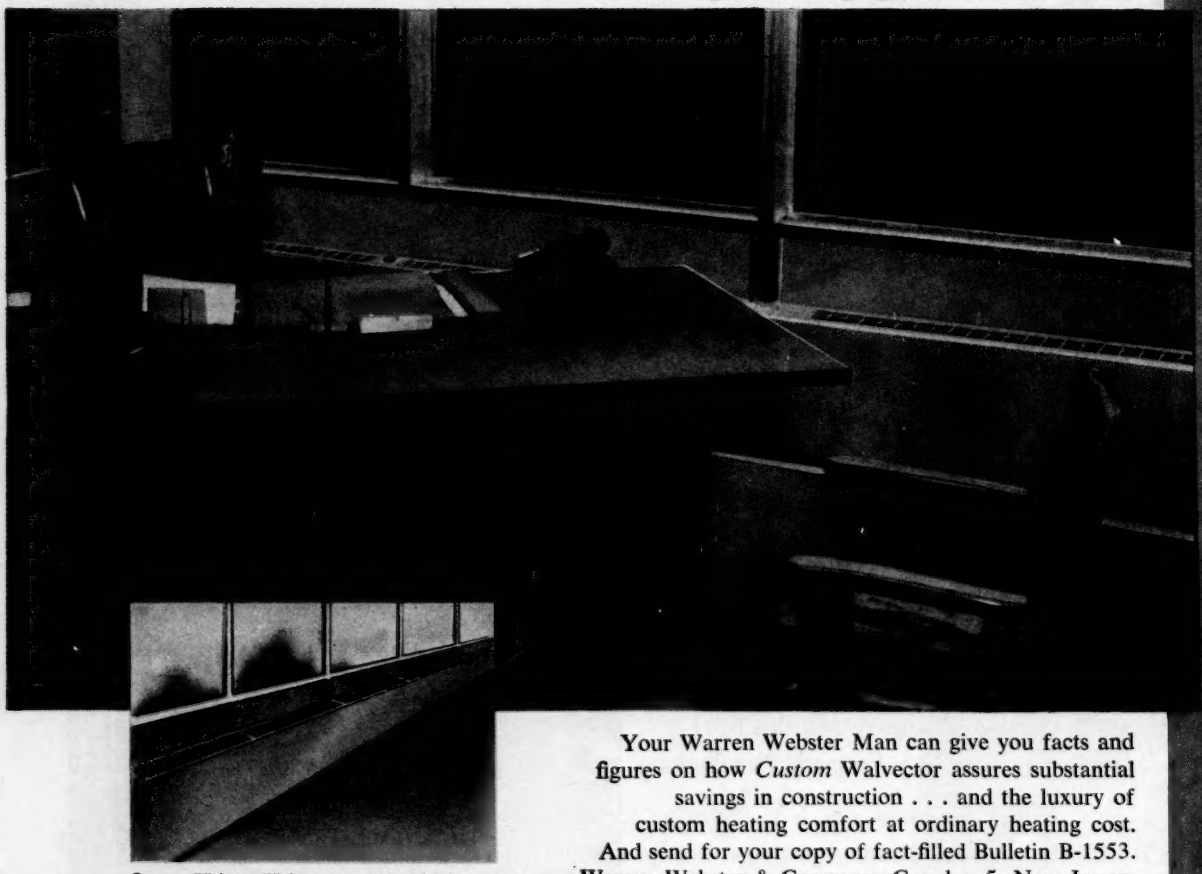
NEW
Heating Comfort
NEW
Building Economies

Custom Webster Walvector, for Tru-Perimeter Heating with steam or hot water, is the modern comfort-heating that's designed into a building at the blueprint stage. Integrated with the structure itself, it assures proven heating comfort . . . worthwhile savings in building costs.

Architects and engineers are using *Custom* Walvector to end the need for finishing walls beneath windows, to provide integral sills, and to enhance the attractiveness of commercial or institutional interiors. Time-proved Walvector heating element provides gentle, uniform warmth. Wide variety of enclosure types and grille arrangements match every design need. Special metal gauges and colors available.



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HEATING . . . COOLING

AIR CONDITIONING HEATING AND VENTILATING

SEPTEMBER, 1957

Editorial Staff
Editor
CLIFFORD STROCK
Associate Editor
NATHAN N. WOLPERT
Assistant Editors
HAROLD M. ENGLUND
RICHARD L. KORAL

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The Cover: Two huge banks of extended surface coils are used to carry off the heat created by supersonic gales in this wind tunnel at Pasadena, Calif., operated by California Institute of Technology. Photo, courtesy The Trane Co.

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HIGH SPOTS

• Air-conditioning and Refrigeration Institute announces that three old standards have been abandoned as no longer valid or necessary. The three are: ARI 5-50, insulation for cold storage rooms; ARI 5-70, location and inspection of data plates on refrigerant-containing vessels, and ARI 5-80, steel and wrought iron pipe. The Institute recommended that all persons having them in their files destroy them as useless.

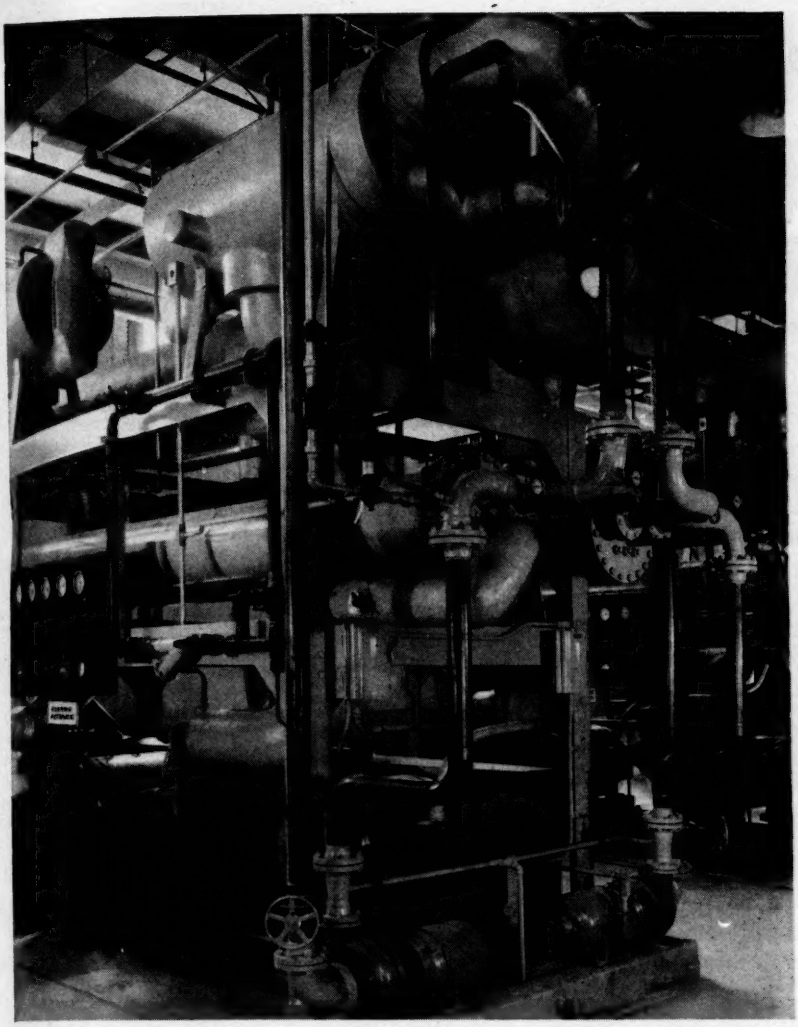
• A record pace is being maintained in the construction of new office space and the rehabilitation of older buildings, according to information revealed by Carrier Corporation. Contracts for central air conditioning of new and existing structures are at an all-time high for the company. Recent orders booked for central systems show a far heavier proportion of smaller or secondary structures, ranging from 8 to 12 stories and averaging 75,000 to 100,000 sq ft of floor area.

• At a recent meeting of the newly formed BACMA (Boiler and Air Conditioning Manufacturers Association), Fred R. Attwood of Spi-Rol-Fin Corporation, was elected president and Mr. Gustav H. Koven, of Waterfilm Boiler Co. and L. O. Koven Co., was elected vice-president. At the same meeting, Mr. M. C. Turpin, for many years executive secretary of American Society of Refrigeration Engineers, was appointed executive secretary. Representatives of the following companies attended: Penn Boiler & Burner Mfg. Corp., Fostoria Pressed Steel Corp., Patco Manufacturing Co., Republic Products Co., Waterfilm Boilers, Inc., Spi-Rol-Fin Corp., Edwards Engineering Corp., and Percoflash Mfg. Co. Purpose of the new organization is to establish non-restrictive test codes and ratings for heating and air conditioning equipment where inadequate codes or no codes exist today. It is the intent of the Association to publish monthly ratings for use by the industry and appropriate governmental agencies.

• Westinghouse Electric Corporation expects heat pump sales in the southern part of the United States to increase 4 to 5 times from current levels by the end of 1957. One reason is development of a split-system heat pump designed particularly for counterflow applications in bungalow-type residences with no basement. This house construction feature has previously prevented industry-wide sales from reaching their full potential because there wasn't room enough for a large single-cabinet heat pump.

• New York City subway riders were unanimous in their praise of air conditioned subway cars. One hundred and fifty of them, responding to questionnaires sent them by the New York City Transit Authority, agreed that the 68 to 79-deg F air in the experimentally air-conditioned cars was a decided improvement. However, many expressed anxiety lest installation result in increased fares. The Authority estimates that it will cost about $63 millions for original equipment, $6.5 millions annually for added power and maintenance. There will be further tests.

• After five years of intensive geological and geophysical research, the first drill test is under way to explore the petroleum and natural gas potential within Canada's Arctic Circle. A number of companies listed at Toronto with prominent American corporations are engaged in the multimillion dollar investigation.



AUTOMATICALLY CONTROLLED supply of —40°F ammonia for process use is produced in ammonia reflux system (left). Two duplex 150 hp Worthington reciprocating compressors are used for low temperature brine system (right). All heat exchange equipment was supplied by Patterson-Kelley.

HOFFMANN-LaROCHE

calls on reliability, efficiency of

P-K EQUIPMENT

for giant cascade refrigeration system

One of the largest automatic cascade refrigeration systems ever built is now operating full-time at the Hoffmann-LaRoche plant in Nutley, New Jersey. This system with 2000-H.P. capacity provides —40°F ammonia and 10°F brine for special process work. Exchangers contain 73,590 feet of tubing. Photo shows one of 4 duplex brine units (4 duplex and 1 single low temperature unit not shown).

In addition, the system offers a unique answer to one of the most complex problems in the refrigeration industry: to provide, automatically, a continuous supply of accurately controlled low temperature ammonia. This was made possible by the use of P-K balance loaders and slug eliminators.

The system, designed by Mr. J. W. Obreiter, Jr., consulting engineer of Hoffmann-LaRoche, is made up of an ammonia reflux system and a low temperature brine system.

Next time your system demands efficient, trouble-free heat transfer performance, it will pay you to call in Patterson-Kelley. For details on the exact equipment to fit your needs, write the Patterson-Kelley Co., Inc., 109 Burson St., East Stroudsburg, Pa.

P-K also makes a complete line of dry expansion, internal fin freon chillers. Write for P-K bulletin 106-T-1.

Patterson Kelley

Flooded and Dry Expansion Type Freon Coolers and Storage Water Coolers • Freon Condensers • Allied Refrigeration and Air Conditioning Equipment

WASHINGTON OVERTONES

by LORING F. OVERMAN

● Inflation overtones were Washington's most persistent sounds as the 85th Congress neared recess. At all official levels—White House, Congress, agencies, and government departments—the narrow chalkmark dividing boom from recession was a subject of concern.

Considered most important from the standpoint of business, was the increase of the rediscount rate (from 3 to 3½%) at most of the Federal Reserve Banks. This being the rate the reserve banks charge member banks for loans, the increase confirms continuation of the tight money policy.

Washington and business were asking:

—why did the FRB Board of Governors decide on such a step at this time?

—do they think the forces of inflation are getting out of hand?

—are further restraints necessary to prevent a runaway?

House Banking and Currency Committee, and Senate Finance Committee, conducting extensive hearings on the financial state of the nation, heard the story from William McChesney Martin, FRB Board Chairman. Said he:

—"Federal Reserve policies can influence the money market, but cannot control it.

—"We lean against the wind, but we never make the wind.

—"Avoidance of booms and busts is goal of present monetary policy, but controls could never eliminate ups and downs of the economy. Monetary policy cannot do it all; we must work with fiscal policy.

—"Businessmen cannot keep on marking up prices without getting into trouble.

—"The tight-money policy is a misnomer. Actually, we have been faced with loose money. It has been tight in the sense that demand has been tantamount to a California gold rush.

—"The No. 1 economic problem that the country is facing today is the cost of living, and I think we have to come to grips with that. I think Congress has to come to grips with it, that the American people have to come to grips with it. I think the Federal Reserve Board and all the agencies of the government have to come to grips with it."

● Defense Department is taking the lead in seriously curtailing expenditures. One of the last official acts of retiring Secretary of Defense Wilson was to ordet immediate cutbacks.

From the 40.2 billion dollar a year rate spent for defense during the last six months, Defense Department has been ordered to chop at least 2.6 billion dollars.

Ramifications of the cut will involve military personnel, production workers' jobs, manufacturing facilities, residences, commercial facilities, places of amusement—and many more of direct interest to air-condition and heating-ventilating people.

Armed forces are to be cut as much as 300,000 uniformed men—from 2.8 million, with important cuts in civilian forces.

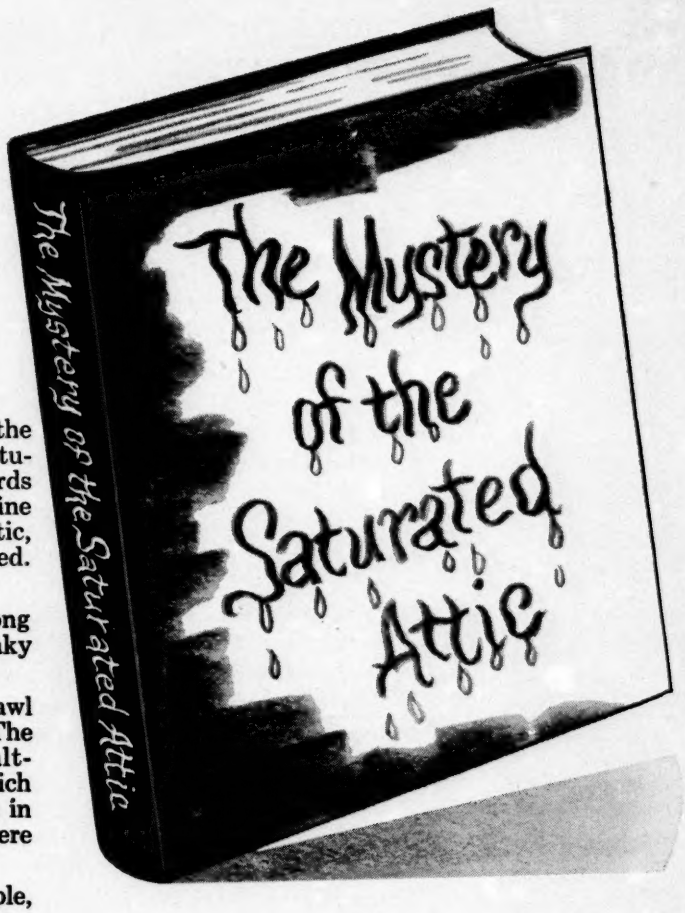
At presstime for this column, only half of the planned cutbacks had been announced. Overall effect will be 5% cut in arms spending in some industries; 10 to 20% in others; drastic curtailments for some individual companies.

● If the curtailed defense program presents problems to some members of the air-conditioning, heating, and ventilating industries, waning summer did bring one bit of good news to both business and individual taxpayers.

—House Ways and Means Committee announced plans to hold public hearings on need for tax revision, starting January 7, 1958.

(Continued on page 8)

An Actual Case History



"Where did the water come from?" asked the harassed owner. All winter water had been actually dripping from the rafters and roof-boards in the insulated attic of the new wing of her fine New England home. Things stored in the attic, even inside trunks, became wet and mildewed. Windows downstairs were often wet.

The wetness had persisted even during long spells of dry weather, which ruled out a leaky roof and rain as a cause.

We hunted for vapor. The floor in the crawl space underneath the wing seemed dry. The bulky insulating material, with an asphalt-impregnated paper facing the ground, which had been installed between the floor joists in the crawl space, also seemed dry. There were no leaky pipes.

The two occupants were professional people, away most of the day. Use of the laundry, kitchen, etc. was minimal. All combustion, vapor-forming appliances were properly vented.

"What should we do?" the owner asked.

THE SOLUTION

It was proposed that scientific multiple aluminum insulation (which is long and continuous and has almost zero vapor permeability,) be installed beneath the floor joists along the entire crawl space, and that ventilation be provided to the crawl space.

The results were magical. In a short time the *attic was dry, the downstairs windows clear.*

"WHO DUNNIT"

This indicated that the source of the trouble had been a flow of water *vapor,* (which is a gas) from the seemingly dry ground, through the asphalt paper and other materials between the joists to the room above, where some of it condensed on the cold window panes. Also a flow thru wall stud spaces, past the ceiling, and finally into the cold attic where it also condensed.

The ground under some buildings gives off as much as 96 lbs. of vapor a day per 1,000 sq. ft. It is invisible and harmless, until it condenses.

Two excellent publications are almost indispensable for those interested in problems of condensation and heat and vapor flow. One is an official study of the control of condensation in crawl spaces, with special reference to the effect of aluminum insulation, based on National Bureau of Standards tests. It is the National Housing Agency's "Technical Bulletin No 38." The other is "Heat Flow by Radiation in Buildings, Simplified Physics," by Alexander Schwartz. He discusses theoretical, practical, and commercial phases of the subject in highly readable style, in a profusely illustrated pamphlet. *Both* may be obtained by checking the coupon.

THERMAL VALUES
Infra Type 4 Parallel Insulation

Down-Heat C .042*=7⅞" non-metallic insulation†
Up-Heat C .105*=3⅛" non-metallic insulation†
Wall-Heat C .068*=4¾" non-metallic insulation†

Cost installed between wood joists, material and labor, about 8¢ sq. ft.

Type 6 also available

Can be purchased everywhere through your preferred local dealer.

*Determined by method of National Bureau of Standards in H.H.F.A. Research Paper 32.
†Calculated on basis of limiting thermal values cited in Fed. Specs. LLL-I-321b; HH-I-585; HH-I-521c; HH-I-551a.

Infra Insulation Inc., 525 Bway., N. Y., N. Y. Dept. V-9
Send ☐ "Technical Bulletin No. 38."
☐ "Heat Flow by Radiation in Buildings."

NAME_____

FIRM_____

KIND OF BUSINESS_____

ADDRESS_____

WASHINGTON OVERTONES *(Continued from page 6)*

—With more than 1,500 tax reform proposals before Congress, hearings are expected to last several months.

—Persons wishing to testify before the committee should apply before December 2, 1957, by writing to Clerk of the House Ways and Means Committee, 1102 New House Office Building, Washington 25, D. C.

Proponents of tax reform consider the announcement of a public hearing a most favorable piece of news. Many have long protested the present tax system as unfavorable to business expansion. The coming hearings will offer opportunity to give these viewpoints official status.

● Another break for exponents of taxation reform was introduction by Representative Herlong (D-Fla.) of H.R. 9119, a tax measure identical to one introduced previously by Representative Sadlack (R-Conn.)

Both Sadlack and Herlong are members of the House Ways and means committee. With both sponsoring identical tax reform measures, the movement takes on bi-partisan characteristics. Explained Mr. Herlong:

—"H.R. 9119 is designed primarily to lessen the tax impact on individuals and growing businesses and to moderate the tax barrier to starting new businesses.

—"It must be recognized that the problem is entirely a matter of rates.

—"Approximately 84% of the over four million business units in the country are unincorporated. The major tax impediment for these businesses and the owners of incorporated small business, is found in the steeply graduated rates of individual tax."

● Congress attached to H.R. 232 (a minor tax bill) an amendment to strictly limit the rapid amortization program beginning August 22, and ending the program completely on December 31, 1959. After August 22, rapid amortization of new construction would be limited to facilities:

—to produce new or specialized defense items or components of new or specialized defense items.

—to provide research, development, or experimental services for the defense program.

● Chairman Carl Vinson (D-Ga.) of the House Armed Services Committee is urging passage of H.R. 8711 to strip the Defense Department of its authority to negotiate defense contracts.

—Army spokesmen think it "inevitable that 85% or more of armed services contracts will be negotiated."

—Vinson's answer: "We are going to carry out the philosophy of as much competition as possible."

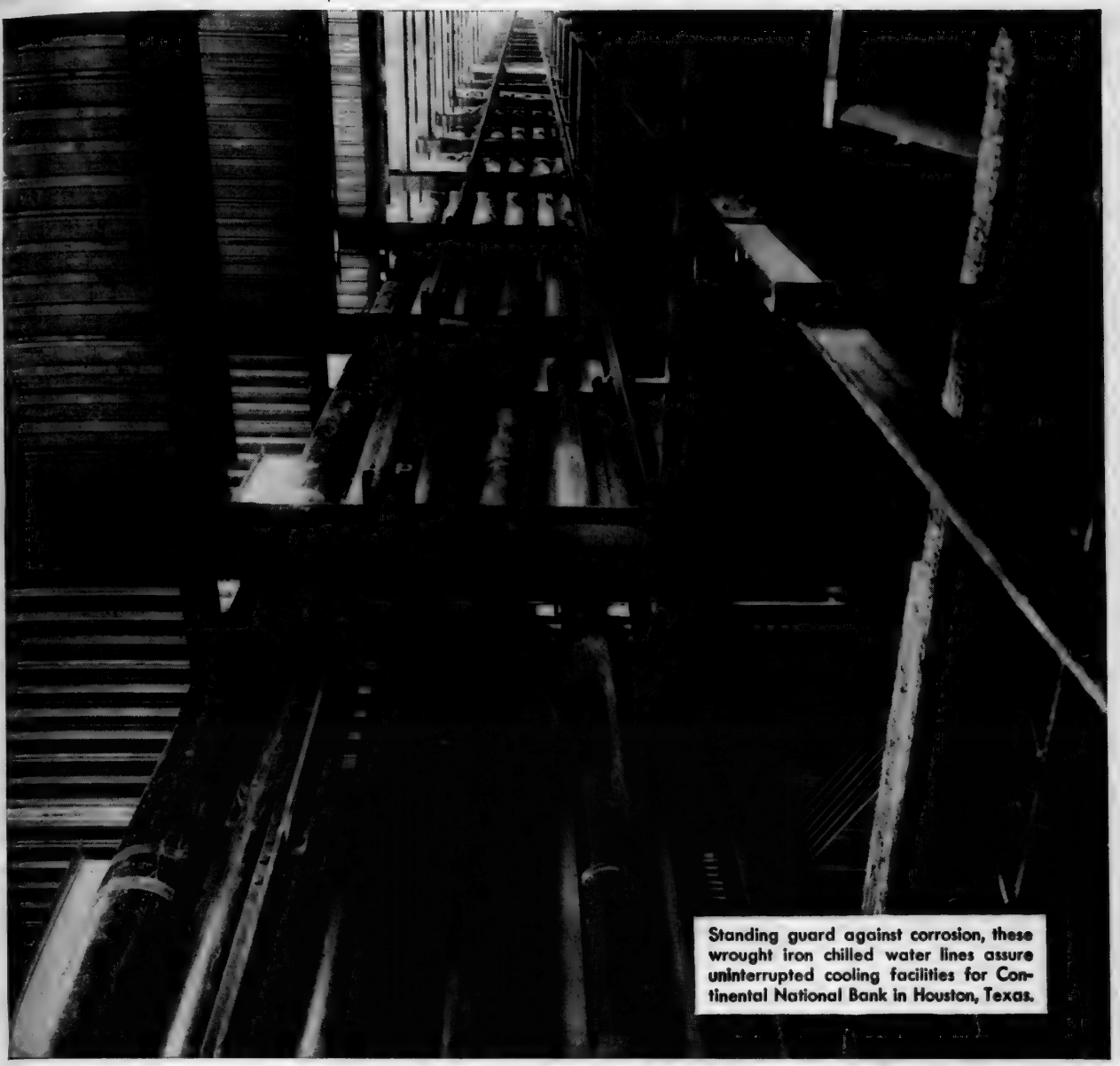
● Attracting capable businessmen to Washington for temporary assignments to government posts is becoming a major headache. Reasons:

—Congress has been extremely critical of WOC appointments (businessmen on loan from their companies, and serving without government compensation). Congressmen have "feared conflict of interests".

—Senate Government Operations Committee will hold hearings on H.R. 7390, providing statutory standards for government advisory committees. Administration objects to the legislation, contending it will make enlisting businessmen even more difficult.

● Recent Government action lowering down payment requirements on FHA financed homes, and permitting higher interest rates, will not affect residential construction to any marked extent this year.

● Housing starts in July were at the annual rate of 980,000—below the million-a-year mark for the seventh consecutive month. The figure was up one percent from June, and five percent above the March low of 933,000. In July of 1956, the per year rate of starts was 1,070,000.



Standing guard against corrosion, these wrought iron chilled water lines assure uninterrupted cooling facilities for Continental National Bank in Houston, Texas.

Air Conditioning with Wrought Iron Pipe saves premature maintenance and replacement costs

Wrought iron pipe's ability to last a long, long time in air-conditioning service can save the cost of emergency repairs usually associated with less durable piping materials.

This resistance to corrosive attack stems from the thousands of iron silicate fibers which make up wrought iron's structure. These glasslike, non-rusting fibers prevent pitting and rapid penetration.

We have case history evidence of wrought iron pipe's reliability in carrying corrosive brines and waters. Our booklet, *Wrought Iron in Refrigeration and Air Conditioning Systems*, gives the details. Write for a copy.

A. M. Byers Company, Pittsburgh, Pa. Established 1864. Division Offices in Boston, New York, Philadelphia, Washington, Atlanta, Pittsburgh, Chicago, St. Louis, Houston, San Francisco. International Division: New York, N.Y.

Available in Canada and throughout the world

BYERS Wrought Iron Tubular and Hot Rolled Products

ALSO ELECTRIC FURNACE QUALITY STEEL PRODUCTS

BRIEFLY STATED

AMONG THE ENGINEERS—The recently organized firm of consulting engineers of P. H. ZIEL-J. S. BLOSSOM & ASSOCIATES is now located in larger quarters in the Gwynne Building, 206 East Sixth Street, Cincinnati, Ohio. Mr. Ziel is experienced in high temperature water for space heating. Mr. Blossom was 18 years with Mechanical Heat & Cold, Inc., Detroit. Mr. Allen Brown, Jr., is in charge of electrical engineering, Mr. Raymond H. Stevens in charge of heating and ventilating.

WITH THE INSTITUTES AND ASSOCIATIONS—John Frazier, sales promotion manager of American Air Filter Company, has been named to the Marketing Research Committee of PRODUCERS' COUNCIL, INC., a national organization of manufacturers of building equipment. Jack O'Neil, assistant advertising manager of AAF, has been selected for the Council's Merchandising Committee . . .

New president of HEATING & COOLING COIL MANUFACTURERS ASSOCIATION for 1957-58 is T. W. Ernst, of Trane Co.'s Coil Sales Department. Chief objective for the coming year is industry-wide recognition of coil rating code developed by HCCMA . . . Almost one thousand advance registrations to date are reported by AMERICAN INSTITUTE OF SUPPLY ASSOCIATIONS, INC., for its 6th Annual Convention in New York City, as 131 plumbing and heating manufacturers reserve 131 booths . . .

Members of three important committees of AIR MOVING AND CONDITIONING ASSOCIATION are named by AMCA president W. H. Rietz of Ilg Electric Ventilating Company. E. E. Trickler, vice president of sales, New York Blower Company, is chairman of Certified Ratings Committee. Members are H. F. Brinen, Young Radiator Company; W. A. Curtis, Peerless Electric Company; E. W. Petersen, American Blower Division of American-Standard; E. J. Stone, Propellair Division of Robbins & Myers; and J. W. Wilcock, Westinghouse's Sturtevant Division. On the Engineering Committee are H. R. Bohanon, Acme Equipment Company; W. A. Curtis, Peerless Electric; C. O. Fury, Clarage Fan Company; J. E. Gill, Buffalo Forge Company; J. J. Merrick, John J. Nesbitt, Inc.; and R. E. Parker of Ilg. Named as members of the Standards Committee are H. R. Bohanon; H. F. Brinen; J. J. Friedler, Ilg; L. G. Malissa, Penn Ventilator Company; J. W. Mathis, New York Blower Company; and G. E. Szekely; Bayley Blower Company . . .

Many companies will show new developments in combined heating and cooling to stress economies in combination systems at the 10th Air Conditioning & Refrigeration Exposition when it returns to Chicago, November 18-21, according to its sponsor, AIR CONDITIONING & REFRIGERATION INSTITUTE. During the show the following will hold meetings: AIR CONDITIONING & REFRIGERATION WHOLESALERS, AMERICAN SOCIETY OF REFRIGERATION ENGINEERS, NATIONAL COMMERCIAL REFRIGERATION SALES ASSOCIATION, NATIONAL WARM AIR HEATING & AIR CONDITIONING ASSOCIATION, REFRIGERATION & AIR CONDITIONING CONTRACTORS ASSOCIATION, and REFRIGERATION SERVICE ENGINEERS SOCIETY . . .

To make modernization work more convenient for homeowners, plumbing contractors are offering a package deal, PLUMBING AND HEATING INDUSTRIES BUREAU reports. The contractors will coordinate the work of all other tradesmen and will make one price to cover the entire job. Thus, one monthly payment will take care of everything involved in getting a new bathroom, the Bureau points out . . . Top authorities in various phases of air pollution control will brief local audiences throughout the nation in the basic elements of the problem during Cleaner Air Week, October 20-26, sponsored by AIR POLLUTION CONTROL ASSOCIATION. Milton Reizenstein, APCA president, stresses public information as one of the essentials for an intelligent approach to air pollution control . . .

Wilbur S. Hokom, Beverly Hills, Calif., was elected president of NATIONAL ASSOCIATION OF PLUMBING CONTRACTORS at the Association's 75th Annual Convention in Dallas. John M. Rhoades, Sarasota, Fla., is vice-president; I. L. Rechkemmer, Canton, Ohio, 2nd vice-president, and F. C. Schilling, Los Angeles, Calif., secretary. Retiring president W. A. Landers will serve as treasurer.

CONSOLIDATIONS CONTINUE—Combining their product design, development and manufacturing facilities to expand their product lines of air outlets and high velocity air conditioning systems are AIR DEVICES, INC., New York City, and THERMOTANK, INC., Detroit . . . Acquisition of Drying Systems Inc., Chicago, producer of industrial ovens and process air conditioning installations, by THOR POWER TOOL COMPANY of the same city involved a straight cash purchase. The new division will operate as DRYING SYSTEMS COMPANY at the same site and with the same management and personnel . . . PACIFIC INDUSTRIES, INC., has combined two of its operating divisions into one organization. The new division will be known as the CUSTOM-AIRE PRODUCTS DIVISION and will manufacture wall and console heaters formerly made by the San Carlos Manufacturing Division, and forced-air gas heaters for basements and attics.

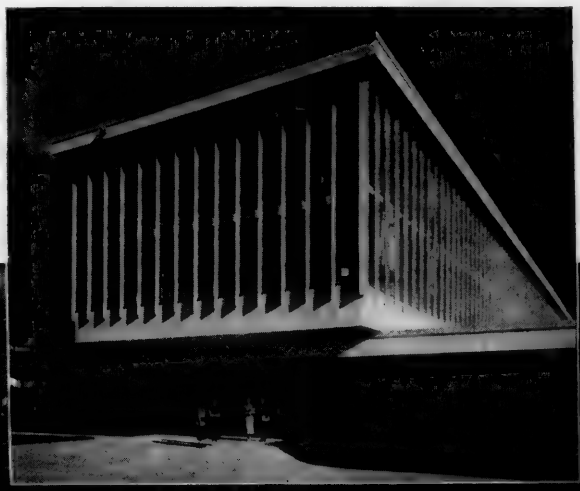
Stockholders of SERVEL, INC., were advised that the company's ALL-YEAR AIR CONDITIONING DIVISION had been sold to ARKANSAS LOUISIANA GAS COMPANY of Shreveport, La., subject to approval by Servel stockholders. They will also be asked to authorize sale of the remainder of the company's assets at such time as is advantageous. These assets include the company's Home Appliance Division . . .

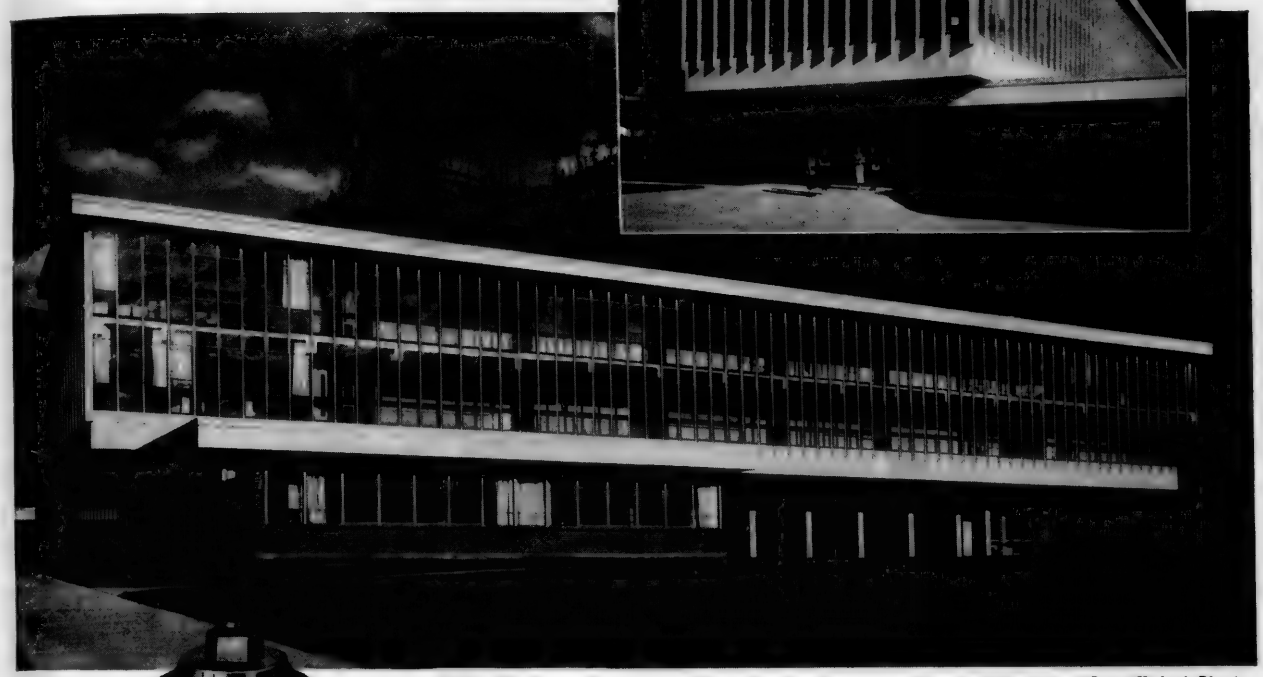
The stockholders of CARRIER CORPORATION and ELLIOTT COMPANY approved the merger terms as submitted by their boards of directors. Elliott is now an operating division of Carrier under its old management, with William A. Elliott continuing as president.

(Concluded on page 12)

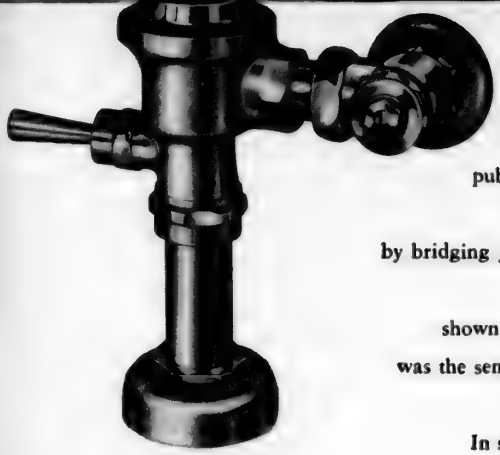
And in Idaho – A FUTURE OF FAULTLESS SERVICE

KELLOGG HIGH SCHOOL
Kellogg, Idaho
CULLER, GALE, MARTELL & NORRIE
and PERKINS & WILL *architects*
LYLE MARQUE & ASSOCIATES
mechanical engineers
DETWEILER BROTHERS, INC.
mechanical contractor
GRINNELL CO. INC.
wholesale distributor
AMERICAN RADIATOR & STANDARD SANITARY CORP
plumbing fixtures manufacturer





Suter, Hedrich-Blessing



Stimulating the civic pride of a mining area in the mountainous panhandle of Idaho, this soundly planned and spectacular DELANY installation has been widely publicized . . . and justly so. A difficult 70 acre site, known as Jacob's Gulch, offered little level land but a solution was neatly achieved by bridging Jackass Creek with the two story classroom wing.

This same flair for the dramatic coupled with the practical is shown in the detailing of the structure. Among the worthwhile decisions here was the sensible selection of DELANY diaphragm type flush valves . . . as rugged and durable as the rocky hills that surround the project.

In schools of prominence, throughout all forty eight states, the trend is to DELANY—"the fastest growing name in flush valves!"

This new "HAND BOOK and CATALOG No. 53" is the most comprehensive of its kind—designed for everyday reference . . . 19 pages of installation details for exposed, concealed and special FLUSH VALVE installations . . . over 75 blue prints . . . cut away views . . . many pages of charts, formulae, piping details . . . sent free, if requested on firm letterhead.

COYNE & DELANY CO. • 834 KENT AVE. • BROOKLYN, NEW YORK

IN CANADA: THE JAMES ROBERTSON CO., LTD.

DELANY *Flush* VALVES

Since 1879

BRIEFLY STATED

(Concluded from page 10)

BURGEONING BUSINESS—The new steel service plant of JOSEPH T. RYERSON & SON, INC., warehousing subsidiary of INLAND STEEL COMPANY in Indianapolis, Ind., which has been under construction since early in 1957, is now open for business, according to an announcement from Robert L. Larson, general manager . . . MINNEAPOLIS-HONEYWELL REGULATOR COMPANY has leased a new $300,000 plant in Fall River, Mass., for production of a new line of electronic industrial controls. The plant is to be a manufacturing unit of M-H's Industrial Division whose president is Henry F. Dever. The plant was built by popular subscription by the Greater Fall River Development Corporation, a non-profit organization. It is part of a long-range program to diversify this once-thriving textile center's economy . . .

Completion of a new 28,000 sq ft addition to its El Segundo, Calif., plant is announced by FARR COMPANY. The $250,000 two-story glass and red brick structure was designed to increase both manufacturing and engineering facilities for air filtration equipment . . . Plans to add one-third additional space to its air conditioning plant in Staunton, Va., were announced by Bruce D. Henderson, WESTINGHOUSE AIR CONDITIONING DIVISION manager. Most of the new space will be used to augment the receiving and warehousing departments . . .

With the signing of an agreement between NATIONAL ELECTRIC PRODUCTS CORPORATION and A. M. BYERS COMPANY, the former was given exclusive finishing and marketing rights to the latter's UL-approved wrought iron electrical conduit . . . ORANGEBURG MANUFACTURING COMPANY has acquired 3½ acres of plant site and 40,000 sq ft of manufacturing facilities in Marion, Ind., from LYNCH CORPORATION for expanding the production of the company's SP plastic pipe. Installation of manufacturing facilities should be completed in six months . . .

A new factory branch office in Salt Lake City, managed by John Lee, was opened by POWERS REGULATOR COMPANY. At the same time the Indianapolis office was enlarged.

CUTTING CAKE—July 19 was the 30th anniversary of TUBE TURNS. The company was owned equally by Keith Dunham Company and Kentucky Oxygen Hydrogen Company, and their successors, the National Cylinder Gas Company and The Girdler Corporation. When the successors merged, Tube Turns became a subsidiary of NATIONAL CYLINDER GAS COMPANY.

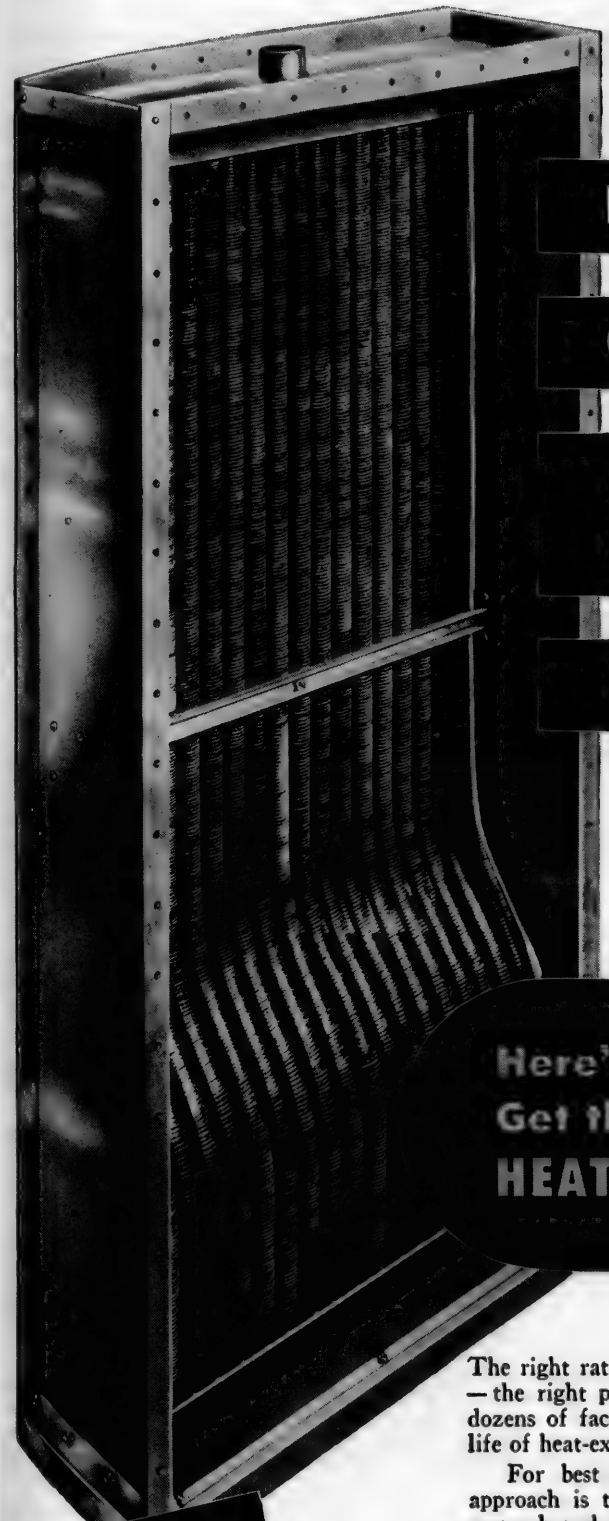
CAPS, GOWNS, AND OVERALLS—Twelve U. S. and Canadian college engineering graduates have completed an advanced engineering training program of THE TRANE COMPANY. The postgraduate course is geared to supplement engineering theory acquired during the engineers' formal, scholastic education. Graduates have been assigned to area sales offices of the company . . . The schedule of classes for 1957-58 AMERICAN BLOWER DIVISION OF AMERICAN STANDARD Commercial Air Conditioning Training School is announced. The school's second year of operation will consist of eighteen one-week courses. Fourteen will deal with service and four with application of commercial air conditioning equipment.

AMONG THE MANUFACTURERS' PERSONNEL—R. K. O'Hara, a vice-president of the First National Bank of Chicago, was named a director of POWERS REGULATOR COMPANY; and H. F. Buckman, manager of the company's accounting department, was named vice-president and secretary . . . Joseph Rohats, a member of the firm's San Antonio office since 1952, heads the Phoenix, Ariz., branch office of THE TRANE COMPANY, while Robert Knowles, with the company for 11 years, directs the Greenville, S. C., office . . . New director of purchases for WALWORTH COMPANY is Alvan Markle . . .

Mr. Burnham Bowden, president of BURNHAM CORPORATION, Irvington, N. Y., announces the appointments of V. A. Good as manager of the HEATING AND COOLING DIVISION (formerly known as Boiler Division) and Albert J. Hall as manager of STEEL PRODUCTS DIVISION. Mr. Good joined the organization in 1927 as a salesman. He is vice-president of the Institute of Boiler and Radiator Manufacturers and a member of the board of directors of Better Heating-Cooling Council. Mr. Hall, who joined in 1925 as a junior clerk, is chairman of the Labor Relations Committee of Steel Boiler Institute . . .

Les Garnsey will be brought into the DUNHAM-BUSH, INC., home offices in West Hartford from the Riverside, Calif., plant where he has been serving as general manager, to become assistant to the president. His successor at Riverside is Chester Silva . . . Robert E. Haubold is the new southwestern regional manager for WESTINGHOUSE AIR CONDITIONING DIVISION; and A. L. McDonald, Jr., is western regional sales manager . . . Donald E. Fry is appointed chief engineer of COPELAND REFRIGERATION CORPORATION. Cary Wilson, general sales manager for MODINE MANUFACTURING COMPANY since joining the company last year, has been elected to fill the newly-created post of vice-president in charge of sales . . . ANDREWS DISTRIBUTING COMPANY, INC., is new distributor for CARRIER CORPORATION in the Nashville-Chattanooga area . . .

SPORLAN VALVE COMPANY has appointed J. D. Boing to its Home Office Sales Department. He has had wide experience in the control field with emphasis on solenoid valves . . . DUNHAM-BUSH, INC., announced the appointment of Primo Bordignon as sales engineer to cover the South Chicago territory. The company also announced the retirement of Edward M. Flannery, vice-president of the company. He had joined Bush Manufacturing Company in 1919, is currently a member of the Advisory Board of Directors of Air Conditioning & Refrigeration Institute.



Heating?

Cooling?

Air Conditioning?

Process?

Here's How to Get the RIGHT Answer to your HEAT-EXCHANGE PROBLEMS

The right ratio of surfaces – the right materials – the right velocities – the right proportion between coil area and depth . . . there are dozens of factors that affect the efficiency, maintenance and service life of heat-exchange coils.

For best performance in your own application, the practical approach is to take full advantage of the unequalled engineering, research and design skill – the unequalled manufacturing and testing facilities – which Aerofin offers you.

To get the *right* answer – ask the Aerofin man.

Aerofin is sold only by manufacturers of nationally advertised fan system apparatus. List on request.

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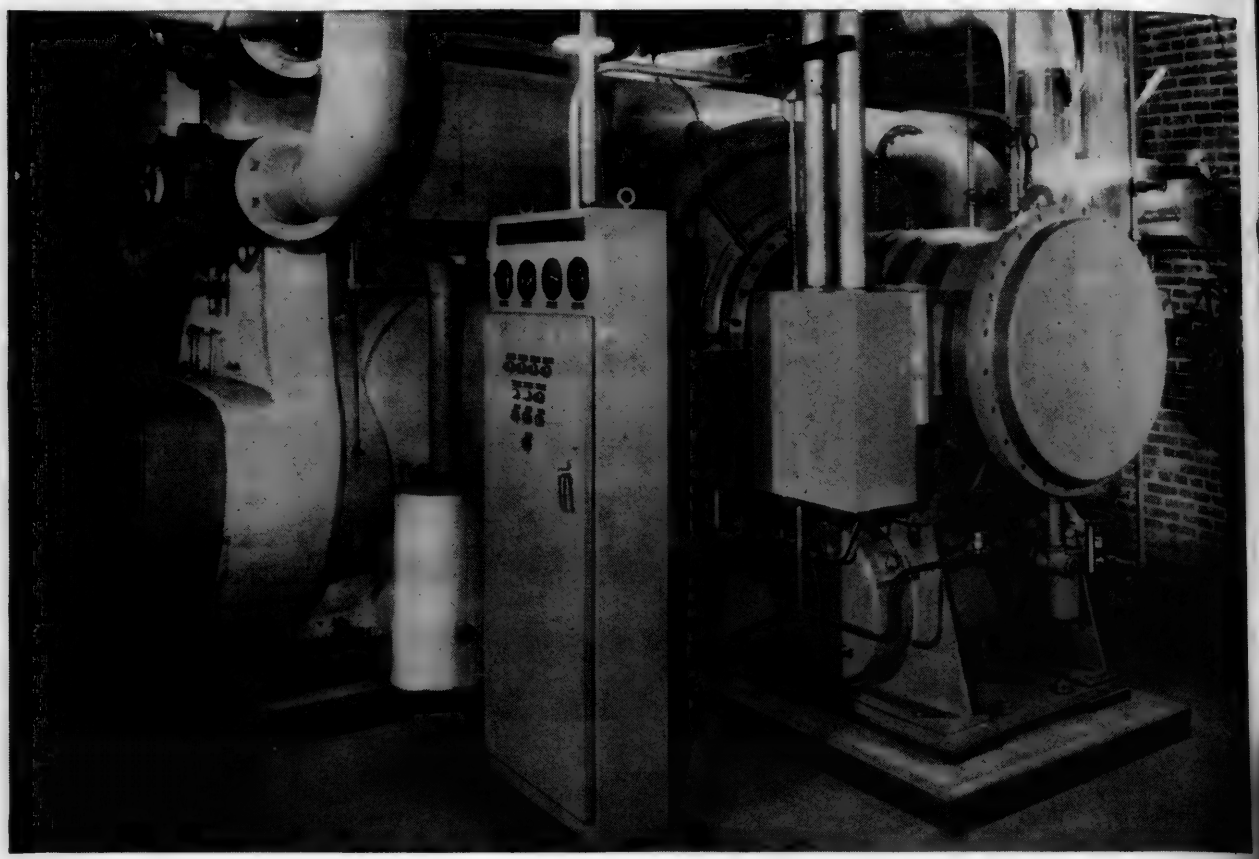


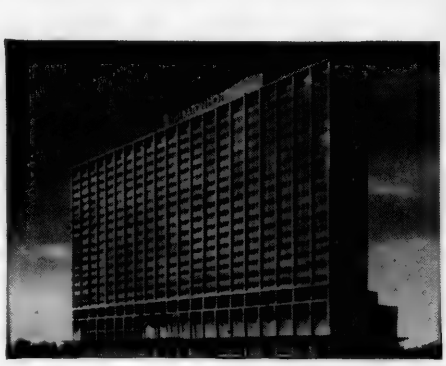
Two 350-ton American Blower Tonracs supply chilled water for the entire Sheraton air-conditioning system.

Tonrac®—heart of the air-conditioning system in Philadelphia's new Sheraton Hotel

To help extend a traditional Sheraton welcome to travelers in the City of Brotherly Love, engineers, builders and mechanical contractors selected two American Blower Tonrac Centrifugal Refrigerating Machines to supply the air-conditioning system in the new Sheraton Hotel.

They chose Tonracs on the basis of their high capacity; their quiet, vibration-free operation; and American Blower's engineering know-how and reputation as a leader in the air-handling and air-conditioning field. The Tonracs supply all the chilled water for 1,000 individual American-Standard Remotaire room units that air-condition 5,700,000 cubic feet of space.

When your client's plans call for air conditioning—call our nearest branch office for invaluable product information. American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.



The 22-story Sheraton Hotel, Philadelphia. Tonracs, installed on the fourth floor, operate so quietly that guests on adjoining floors never hear a sound.

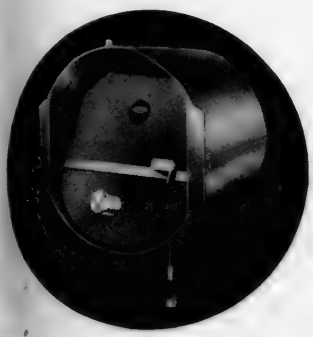
Building Credits
Architects: Perry, Shaw, Hepburn & Dean
Consulting Engineers: Slocum & Fuller
Builders: McCloskey & Co.
Mechanical Contractors: Ambrose-Augusterfer Corp.

AMERICAN BLOWER
Division of AMERICAN-Standard

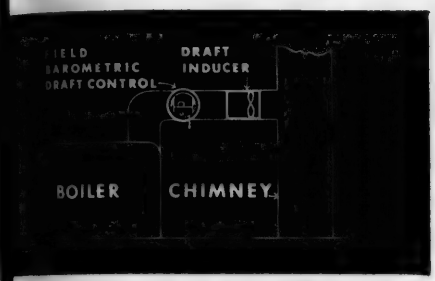
QUALITY PROTECTS YOUR INVESTMENT . . . AMERICAN-Standard QUALITY IS AVAILABLE AT NO EXTRA COST

FIELD BAROMETRIC DRAFT CONTROLS

increase the efficiency of induced-draft installations



FIELD TYPE "M" Barometric Draft Control for coal or oil, sizes up to 32".



Field Barometric Draft Control installed in connection with a draft inducer prevents fuel waste caused by wide variations in draft.

FIELD TYPE "MG" Barometric Draft Control for gas or oil-gas, sizes up to 32".

When a draft inducer is used, to assist a faulty chimney, or to permit modern, low-stack construction, a Field Barometric Draft Control should also be installed. In such an installation, the inducer can be set to meet maximum, "high-fire" draft needs without risk of excessive draft. Whenever the draft requirement is less than the draft inducer setting, the Field Control automatically reduces the draft. Here is why the Field Draft Control can make an important contribution to efficiency at all firing rates:

1 – During "off-fire" periods, even the *natural* draft present may be excessive. Field reduces the draft, prevents rapid cooling of the boiler.

2 – During "low-fire" periods, the artificially induced draft may be greater than needed to vent a relatively small volume of gases. Field regulation prevents the loss of high temperature gases.

3 – During "high-fire" periods the Field Control compensates for continuously variable factors affecting draft. For example:

Changes in line voltage, affecting blower speed, change the volume of gases handled and thereby affect the draft. Changes in resistance caused by the accumulation of fly ash or soot in boiler and breeching cause changes in the draft needed.

Changes in wind and outside temperature, affecting natural draft, cause variations in the artificial draft needed.

Where a number of boilers are discharging into a common stack, the need for draft will vary as firing rates vary. Draft required with all boilers on "high-fire" may be excessive when one or more boilers cut out.

A Field Barometric Draft Control, sensitive to the slightest change in pressure, corrects for any variation, holding draft to the required setting. Write us for technical data. Field Draft Controls are available in sizes up to 32 inches for oil, gas, coal and oil-gas installations.

field

FIELD CONTROL DIVISION

of H. D. Conkey & Company, Mendota, Illinois

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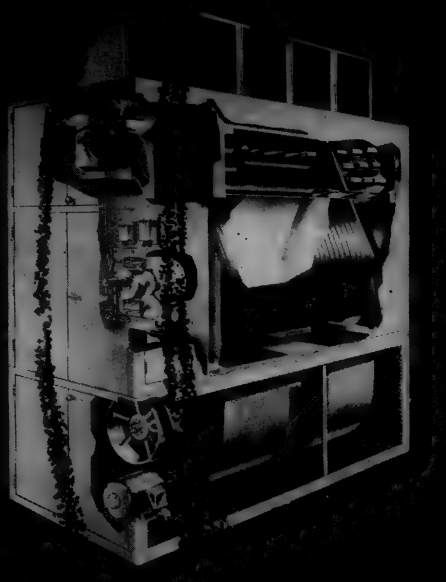
Discharge Plenum
Airfoil
Combustion Chamber
Induced Draft
Firing
Pyrojet Burner
Low-Speed Fans

Dravo presents: the first dual-fuel burner designed specifically for direct-fired heaters

PYROJET *burner tops list of features in all-new Dravo Counterflo heater*

Intensive research by Dravo engineers has resulted in the development of the first dual-fuel burner specifically designed for use in a direct-fired space heater. This burner, the PYROJET, burns light oil, heavy No. 5 oil, or gas with equal efficiency. The combination gas/light oil models feature automatic switchover with *no manual adjustment*. Here are some of the outstanding features of the Dravo PYROJET burner.

- **Totally induced draft assures highest combustion efficiency**
- **Positive ignition of No. 5 oil provided by new dual pre-heater . . . another Dravo exclusive**
- **Automatic switchover on light oil/gas combination models . . . no manual adjustment**
- **Ring and finger design minimizes adjustment and service problems**
- **Combination of zero governor and gas-air premix block assures gas pilot stability**
- **Control options: on-off, hi-low-off, or full range modulation**

Setting new standards of efficiency and convenience, the PYROJET burner is a major part of the entirely new concept of combustion achieved in the all-new Dravo *Counterflo* heater. The stainless steel, airfoil combustion chamber, the new induced draft system, the electronic controls, all contribute to make the new Dravo heater the most economical and flexible space heater available.

Write today for full information on this remarkable new Dravo heater. There is a size and type for every heater application—for economical space heating—for process heating—for tempering make-up air as a duct furnace and for a host of other applications. Address Dravo Corporation, Pittsburgh 22, Pennsylvania.

Ask for Bulletin 564-23

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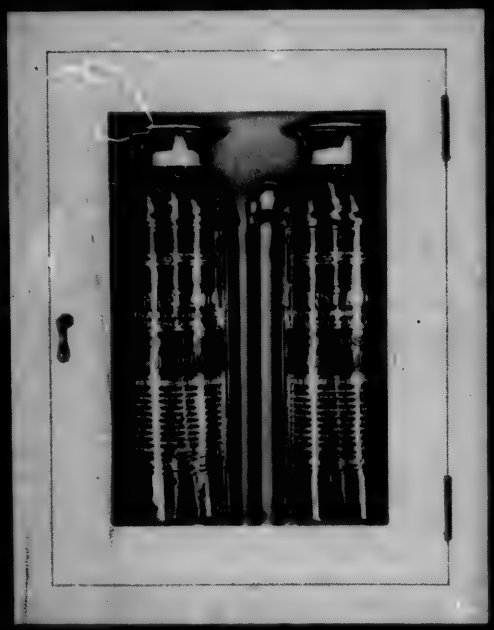
CORPORATION

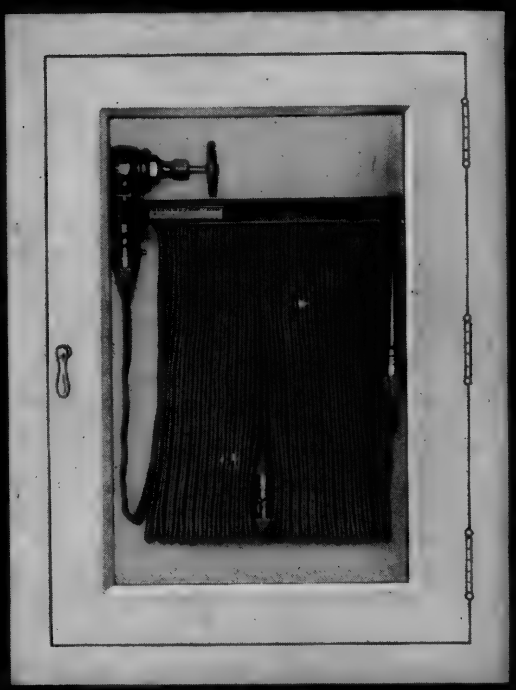
Blast furnace blowers • boiler and power plants • bridge sub-structures • cab conditioners • docks and unloaders • dredging • fabricated piping foundations • gantry and floating cranes • gas and oil pumping stations • locks and dams • ore and coal bridges • process equipment • pumphouses and intakes • river sand and gravel • sintering plants • slopes, shafts, tunnels • space heaters • steel grating • towboats, barges, river transportation

For Interior Fire Protection in SCHOOLS and CHURCHES...

Of the many distinct **ALLENCO** *models, these two are most popular for installations in this field.*



Allenco Fig. 285 is notably compact, contains one or two fire extinguishers and, if specified, tamperproof door.



Allenco Fig. 262 is "custom-sized" to suit choice of 5 hose-lengths, 4 hose-sizes with plain or fog nozzles, with optional spanner and bracket, and space limitations of any application-point.

Cabinets of both units are available in several groups—Allenco Satin Finish Hollow Steel Door, Nella Sheet Steel Door, Aluminum Doors, and other styles. Rigid and true-to-size, they go in faster . . . look better . . . serve perfectly.

Catalog 150
(A.I.A. file 29e2)
contains full details in simplest form, including standard quotable specifications.
Write for your copy now . . .

ALLENCO

Architects, Engineers and Contractors prefer ALLENCO

Here are a few recently completed installations:

Where	What	Specifier	Installer	Fieldman
Springfield, Mass.	Junior High School	Maloney & Tessier	A. E. Stephens Co.	Harold Jope
West Hartford, Conn.	Junior High School	Nichols & Butterfield	Wadhams & May Co.	Harold Jope
Cincinnati, Ohio	Washington Park Elem. School	A. M. Kinney	B. A. Walterman Co.	Dick Disney
Ann Arbor, Mich.	University of Mich. Library	Albert Kahn Assoc.	Dunbar-Borton	Russ Collins
Portland, Ore.	Woodrow Wilson High School	Tom E. Taylor	A. G. Rushlight Co.	Dick Finklea
Salem, Ore.	South Salem High School	Tom E. Taylor	Vern Collins Plbg. Co.	Dick Finklea
Salt Lake City, Utah	Latter-Day Saints Church	Owner	Owner	Nic Nicodemus
New Orleans, La.	St. Martin's School	James M. Todd & Assoc.	Frank A. Dorsa	Bob Barnes
Pullman, Wash.	Women's Residence, W. S. C.	James B. Natkin	Senna Service, Inc.	Stan Schafer
Moscow, Idaho	University of Idaho Library	Whitehouse, Price, DeNeff & Geeble	Detweiler Bros.	Stan Schafer
Minneapolis, Minn.	Zion Lutheran Church	Thorsov & Cerney, Inc.	Dean L. Witcher, Inc.	Art Narverud
St. Louis Park, Minn.	Cathedral High School	Louis C. Pinault	Roel Construction Co.	Art Narverud
LaFayette, Ind.	Purdue University Dorms	Walter Scholer	Freyn Bros.	Don Davisson
Bloomington, Ind.	I. U. Medical Science Building	Ammerman, Davis & Stout	Hayes Bros.	Don Davisson
Fairview Park, Ohio	High School	Fulton, Krinsky & DelaMotte	Gorman-Lavelle P & H	Jerry Sullivan
Gates Mills, Ohio	St. Francis of Assisi Church	Horn & Rinehart, Archs. P. B. Fleming, C. Engr.	Gorman-Lavelle P & H	Jerry Sullivan
Pittsburgh, Pa.	High School	Celli & Flinn	John Kennelly	Wm. Negle

Harold Jope

Dick Disney

Russ Collins

Dick Finklea

Nic Nicodemus

Bob Barnes

Stan Schafer

Art Narverud

* **ALLENCO** *Fieldmen, operating from offices in 35 principal cities, offer prompt and useful help. Check "Fire Protection" in your classified phone directory or write for address of nearest office.*

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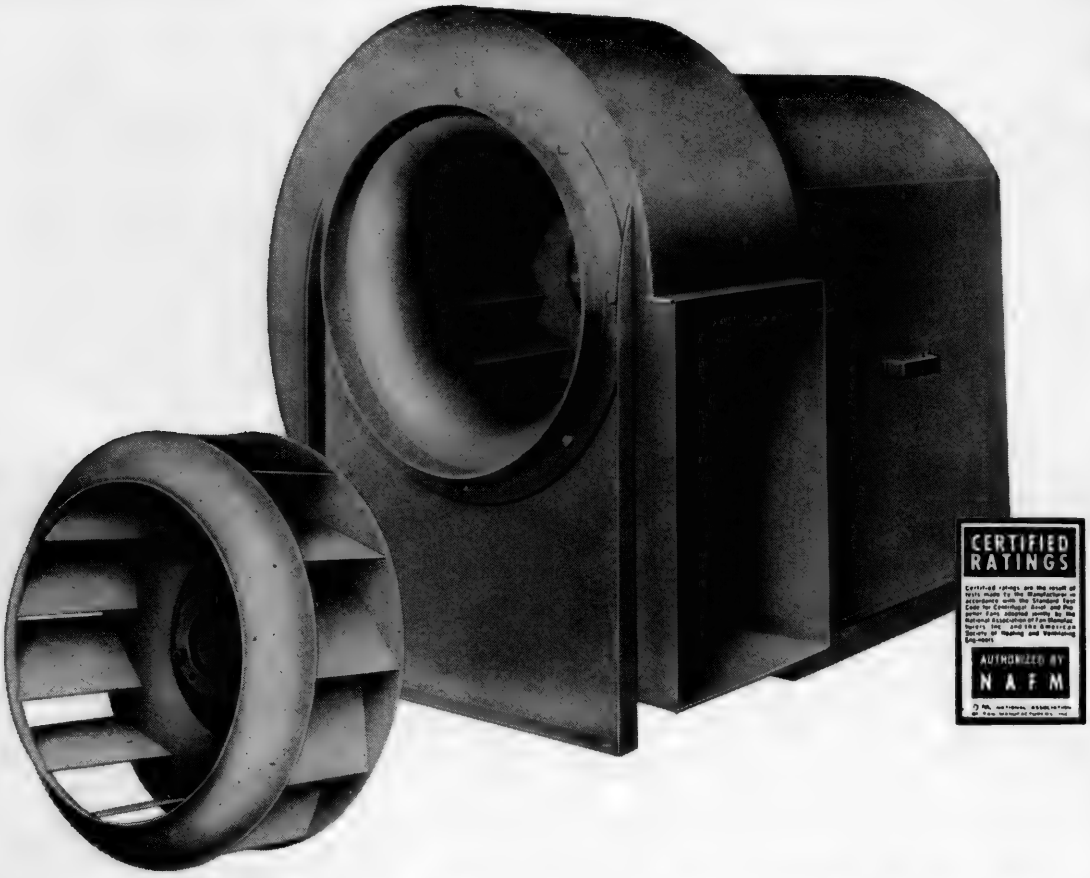
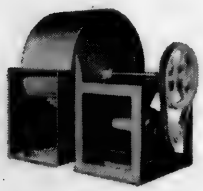


Backward Curve Blowers—Certified Ratings

Completely Designed, Engineered and Manufactured by Peerless Electric

Peerless Backward Curve Blowers are all Peerless—motor and all. We control the entire production of this versatile blower, from drawing board to finished product. We guarantee it unconditionally for quiet, trouble-free operation.

Peerless Backward Curve Blowers can be specified with confidence. They are thoroughly tested according to test codes. They meet NAFM and NEMA standards. Scores of them are operating in schools, churches, hospitals and government installations.

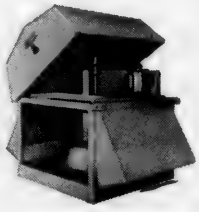


FORWARD CURVE BLOWERS

Made entirely by Peerless; arc-welded housings and frames; wheels designed for quieter operation; dynamically balanced.

CENTRIFUGAL ROOF VENTILATORS

Matching wheel cone accurately fits spun venturi for quieter, smoother air movement. All welded construction; material 16 ga. or over. Each unit air tested, and rated to assure certified PFMA ratings. Fits standard curbs.



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Peerless Electric

FAN AND BLOWER DIVISION

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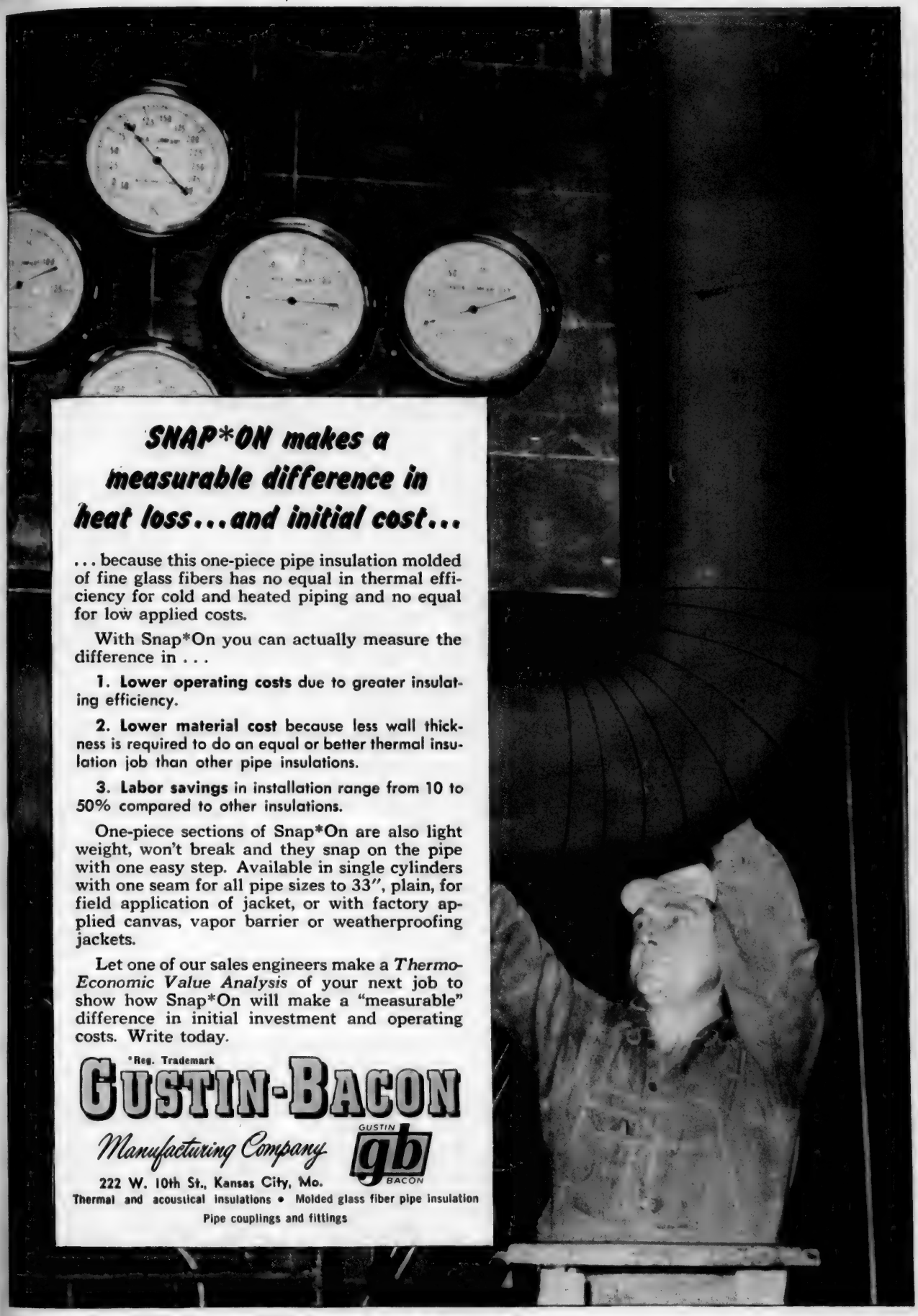
Write Today for Bulletins SDA-220, SDA-200 and SDA-160.



*SNAP*ON makes a measurable difference in heat loss...and initial cost...*

... because this one-piece pipe insulation molded of fine glass fibers has no equal in thermal efficiency for cold and heated piping and no equal for low applied costs.

With Snap*On you can actually measure the difference in . . .

1. **Lower operating costs** due to greater insulating efficiency.

2. **Lower material cost** because less wall thickness is required to do an equal or better thermal insulation job than other pipe insulations.

3. **Labor savings** in installation range from 10 to 50% compared to other insulations.

One-piece sections of Snap*On are also light weight, won't break and they snap on the pipe with one easy step. Available in single cylinders with one seam for all pipe sizes to 33", plain, for field application of jacket, or with factory applied canvas, vapor barrier or weatherproofing jackets.

Let one of our sales engineers make a *Thermo-Economic Value Analysis* of your next job to show how Snap*On will make a "measurable" difference in initial investment and operating costs. Write today.

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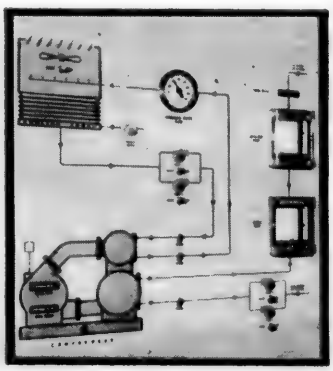
Thermal and acoustical insulations • Molded glass fiber pipe insulation

Pipe couplings and fittings

Next logical step in control panel development

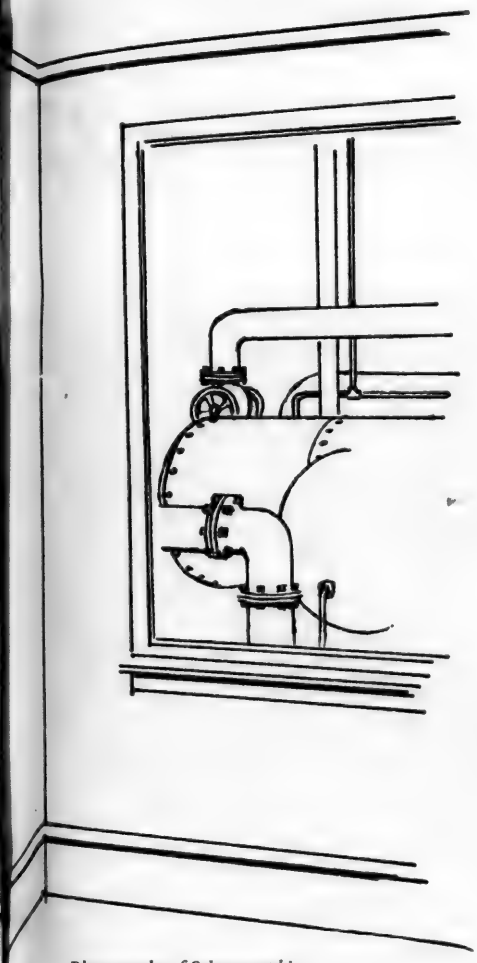
HONEYWELL SELECTOGRAPHIC SU

Center panel. Main feature here is the projection screen which replaces system diagrams and floor plans that take up much of the area on present panels. Here, on one screen, the desired diagram or plan is flashed, while at the same time console controls are switched to the system shown. Other features include temperature indicator, intercom control and push-buttons for temperature logging and system adjustments.



Refrigeration panel. All major electrical accessories of refrigeration system can be started and stopped from this panel. The chilled water temperature is controlled by a Tel-O-Set® instrument in the chilled water supply line. A second Tel-O-Set indicates and records cooling output in Btu. The total Btu output is shown on a numerical counter which can be compared to the total electrical input shown on a similar counter.

SUPERVISORY DATACENTER*



Photographs of Selectographic Supervisory DataCenter are of pilot model being demonstrated in all principal cities.

Panel of tomorrow has revolutionary systems and floor plan projector that automatically gives visual picture of operation of entire air conditioning system.

IN A BUILDING equipped with a Honeywell Selectographic*, the engineer will be able to take a "look" at any part of his air conditioning system merely by pushing a button.

On his screen he will be able to project, one at a time, as many as 50 fan system diagrams and floor plans.

What this means is that at one small console he can control, with precision, the air conditioning system in even the largest building. For as any given floor plan appears, controls and dials are automatically switched to correspond with the plan. This provides, within a small space, all the advantages of larger panels that have permanent system diagrams and floor plans.

Each projected plan will contain symbols to show what readings or adjustments may be made at the panel.

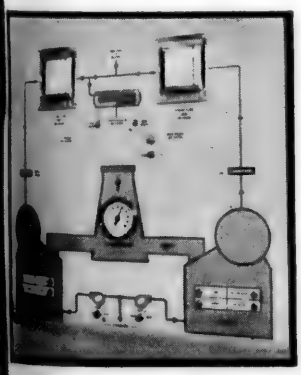
An intercom has been built into this Supervisory DataCenter to enable the engineer to talk to his men working on any part of the system.

And from this one location in his office the engineer can read and adjust key temperatures throughout the building—outside air, mixed air, discharge from cooling and heating coils, return air, space thermostats, hot and cold ducts in dual-duct systems.

Besides all the new advantages, this Selectographic DataCenter offers the traditional benefits of Honeywell electronic control panels: Greater operating efficiency with less personnel time, more efficient use of specialized manpower . . . longer equipment life . . . operational savings that liquidate cost . . . attractive display of your engineering design . . . and a more comfortable building.

For further information about the Selectographic DataCenter (custom designed to fit the needs of the individual building), call your local Honeywell office. Or write to Minneapolis-Honeywell, Dept. HV-9-245, Minneapolis 8, Minnesota.

*tradmark



Heating panel. Lights indicate the status of the pilot and main burner. Warning lights respond to steam pressure and water level. Stack temperature is continually indicated. Tel-O-Set* instruments also indicate and record steam pressure and flow from each boiler. Total steam flow is indicated on a numerical counter for each boiler. Complete operation of the boiler plant can be supervised from this section of control panel.

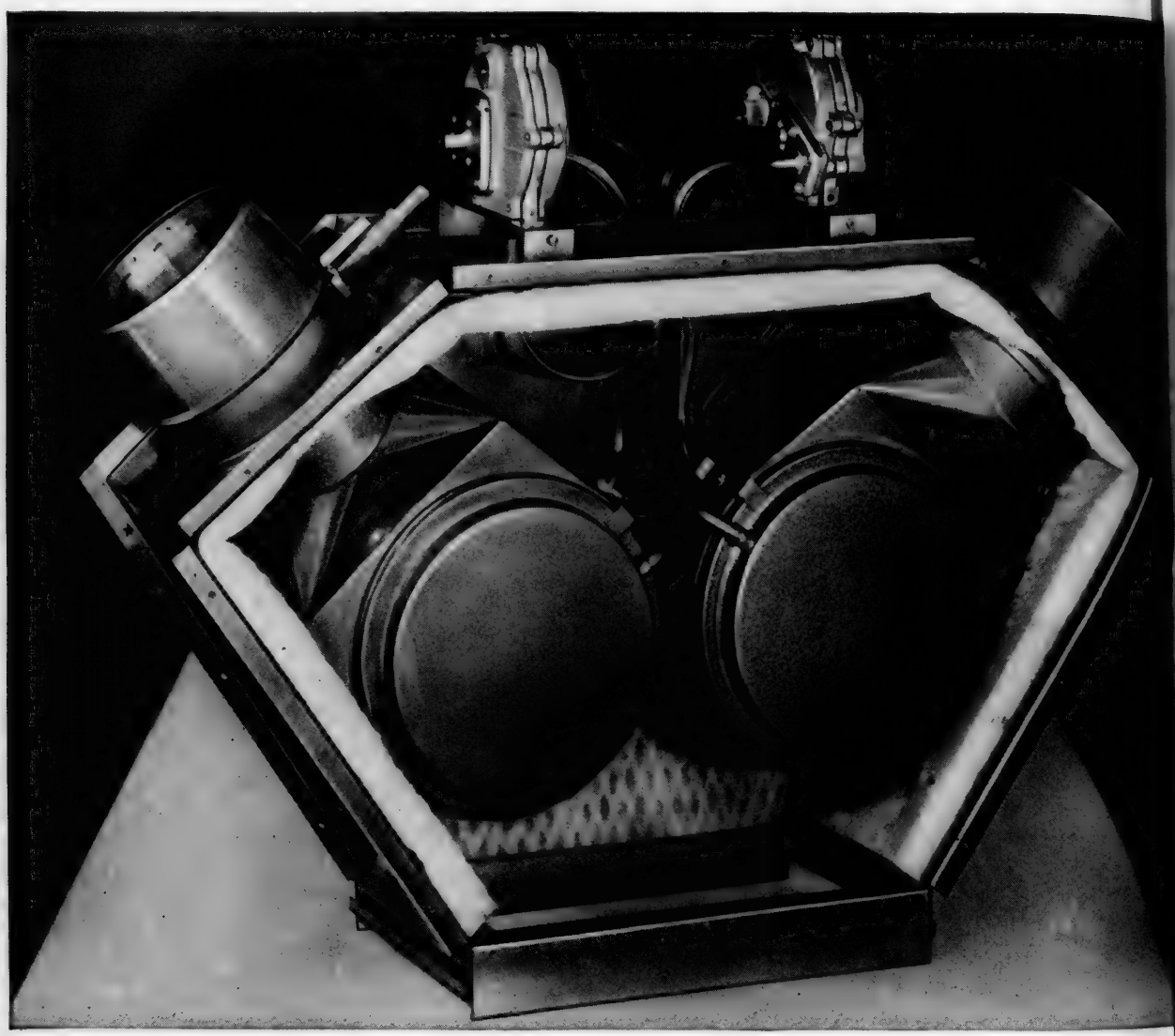
For news about another major Honeywell contribution to indoor climate, turn the page.——→

Control Leadership through advanced engineering-research

Calibrated dial air balancing is the key to the superior performance of the Honeywell High Velocity Air Blender. You adjust dial only once, need never recalibrate again. Once balanced, comfort control is in the hands of the system thermostats.

Dial Air Balancing

NEW HONEYWEL AI
HIGH VELOCITY DI



Fits any mixing box. The configuration you see here is but one of the many possible for ceiling units. Also, it's now available in nearly every under-the-window type unit. From the new Honeywell Blender you can expect controlled volume of air, constant CFM, long valve life and simplified control. The thermostat in the system controls temperature by controlling the volume of hot air passed by the hot duct. At the same time a flow regulator provides a constant hot air volume for a given thermostat signal under variations in supply duct pressures. A constant total flow is provided by a total flow regulator which operates the cold air valve to make up the difference between hot flow and desired total flow.

Control leadership through advanced engineering—research

AIR BLENDER SOLVES DUAL-DUCT DISTRIBUTION PROBLEMS

Provides constant delivered air volume, needs no recalibration when you add to system

WITH THE new Honeywell Air Blender your clients get the level of comfort they want—on the simple call of the room thermostat.

They get this easily, because the Honeywell Air Blender combines temperature and volume control in one unit.

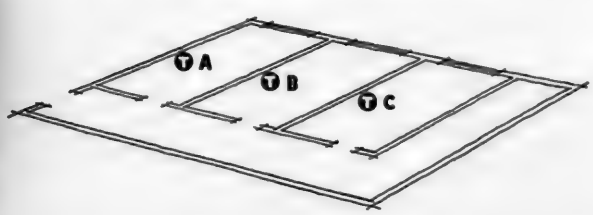
And comfort doesn't come at the expense of some other room. It comes from the system. *One room no longer "robs" another of comfort.*

Besides providing constant delivered air volume, the Honeywell Air Blender takes well to change. With Dial Air Balancing you can add to the system without having to recalibrate distribution points that may be scattered widely—especially valuable in floor by floor modernization or on new construction.

Self-powered, the Honeywell Air Blender uses the pressure of the air it is controlling to actuate the diaphragm—its only moving part. Such simplicity makes possible long life and trouble-free performance.

For further information about the Honeywell High Velocity Air Blender and other Honeywell heating and air conditioning products, call your local Honeywell office. Or write to Minneapolis-Honeywell, Dept. HV-9-245, Minneapolis 8, Minnesota.

No room "robs" comfort from another



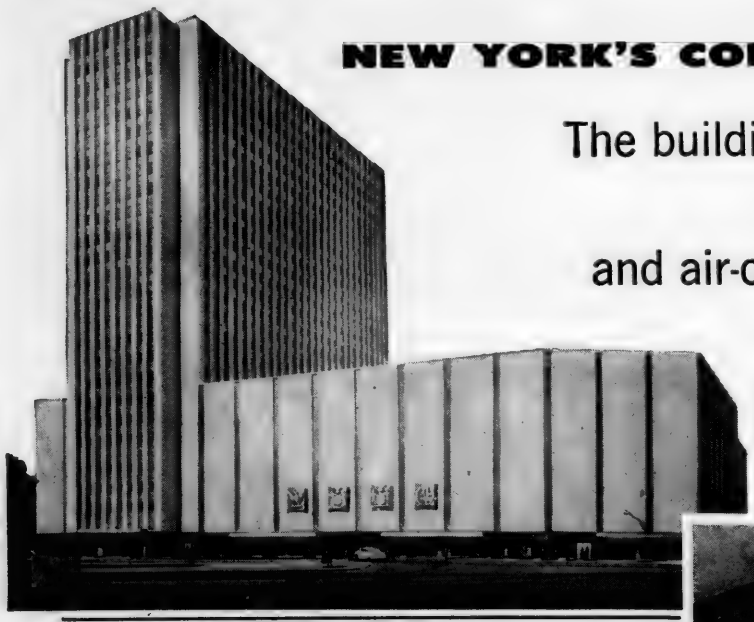
For the first time in high velocity air handling history you can design a system where adjustment in one room doesn't upset comfort balance in others. Thus, in a typical office, adjustment in area A does not rob comfort from B or C. Neither delivered air volume, nor the ratio of hot to cold air is affected in B or C. This is one of the reasons why it's wise to design with the new Honeywell Air Blender in mind.

The "new" look in thermostats that's appearing on walls of commercial buildings throughout America. New design *inside* gives closer control, vastly superior performance.

Only Honeywell gives you all four—pneumatic, electric, electronic, instruments.

Honeywell

First in Controls



NEW YORK'S COLISEUM—

The building that "has everything" has heating and air-conditioning systems of

NATIONAL PIPE

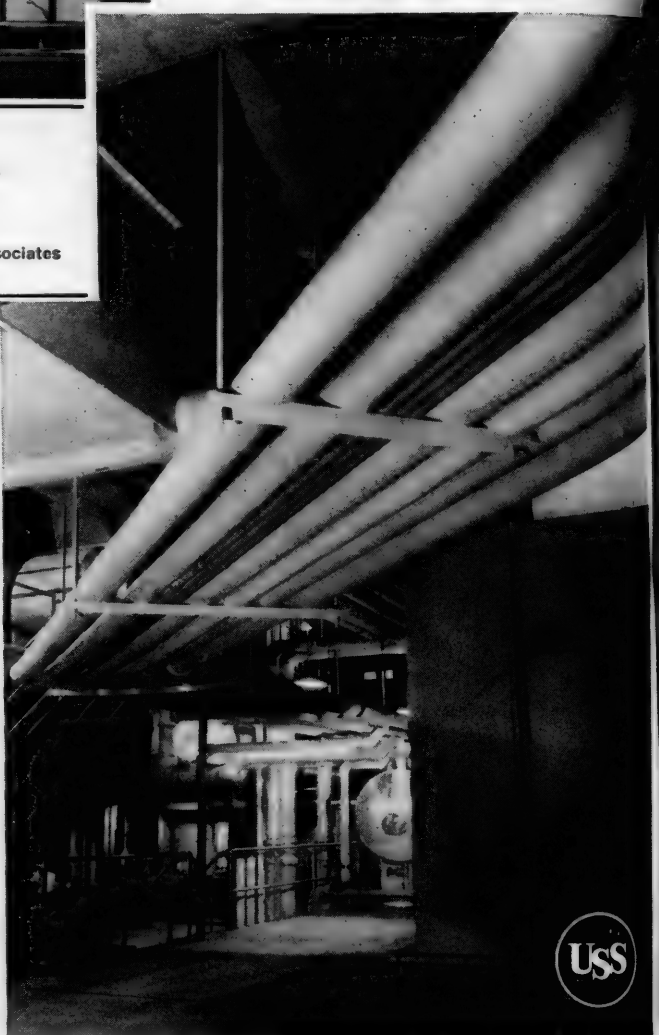
OWNER: Triborough Bridge & Tunnel Authority
ARCHITECTS: Leon & Lionel Levy
CONSULTING ARCHITECTS: Eggers & Higgins, John B. Peterkin, Aymar Embury III
GENERAL CONTRACTOR: Walsh-Fuller-Slattery
HEATING & AIR CONDITIONING: Almirall & Company, Inc.
MECHANICAL & ELECTRICAL ENGINEERS: Guy B. Panero Associates
STRUCTURAL ENGINEER: Dr. Jacob Feld

New York City's Coliseum is one of the most distinctive and functional structures ever conceived. Its 26 floors and giant exhibition hall comprise an auditorium area capable of seating over 10,000 persons, approximately 1,000,000 sq. ft. of usable floor space, and an 850-car underground garage. Except for the garage, the building is completely air conditioned.

More than 376 tons of National Pipe were used in the heating and air-conditioning systems of the new structure. The office building area requires 1,500 tons of refrigeration; the Coliseum proper requires 2,500 tons. Four compressors supply 4,000 tons of refrigeration for the high-pressure air-conditioning system.

Purchased steam is delivered at 125 to 150 psi. Pressure-reducing rigs reduce it to 50 psi and 5 psi for distribution throughout the buildings. Steam requirements are about 102,000 lbs. per hour for comfort heating and auxiliary uses.

Possessing a solid reputation for dependable service, USS National Pipe is the choice of engineers and contractors throughout the country for air-conditioning, heating and power installations. It is synonymous with efficient, satisfactory service under all types of pressure and temperature conditions. For more complete information, get in touch with us. For technical assistance, our engineering staff is at your service.



NATIONAL TUBE DIVISION, UNITED STATES STEEL CORPORATION, PITTSBURGH, PA.
COLUMBIA-GENEVA STEEL DIVISION, SAN FRANCISCO, PACIFIC COAST DISTRIBUTORS
UNITED STATES STEEL EXPORT COMPANY, NEW YORK

NATIONAL PIPE

UNITED STATES STEEL

SINCE 1901 . . . THERMOTANK®
Originators of . . .
HIGH VELOCITY THERMO-REG UNITS
PUNKAH®-LOUVRES AND OTHER DEVICES
LINKED TOGETHER
SINCE 1939 . . . . . AGITAIR
Originators of . . .
SQUARE, RECTANGULAR AND CONTINUOUS DIFFUSERS
ALL TYPES ROUND DIFFUSERS • FILTERS • EXHAUSTERS
For your convenience in solving ALL air handling requirements
Sold Exclusively by Representatives for
IR DEVICES INC.
185 MADISON AVENUE
NEW YORK 16, N. Y.

"Boy, you sure get faster delivery with TUTTLE & BAILEY standard sizes!

"Yeah, and they save you

Our two friends are wise, indeed, and so are the majority of those who specify and install air distribution devices for jobs large or small. From experience they know that when Tuttle & Bailey initiated *standard sizes* (ten years ago!) for grilles, registers and ceiling diffusers it had many real benefits, and still does.

It means that T&B *stocks* standard sizes and that in turn means faster delivery, faster completion of jobs and more satisfied owners. Very important, too, standard sizes are *priced lower!* Incidentally, experience has also proved that T&B standard sizes can meet at least 95% of job requirements.

Use this reference chart of TUTTLE & BAILEY standard sizes

T&B TRI-FLEX supply air grilles and registers

T60	Single deflection grille (vertical face bars)
T64	Double deflection grille (vertical face bars, horizontal rear bars)
T55	Double deflection grille (horizontal face bars, vertical rear bars)
T67	Single deflection register (vertical face bars, vertical damper blades)
T647	Double deflection register (vertical face bars, horizontal rear bars, vertical damper blades)

26 standard sizes

8x4	12x6	16x6	24x6	30x8
10x4	14x4	20x5	24x8	30x10
10x6	14x5	20x6	24x10	30x12
12x4	14x6	20x8	24x12	36x8
12x5	16x5	24x5	30x6	36x10
				36x12

T&B AEROVANE return air grilles and registers

T70D	Grille (horizontal bars)
T78	Register (horizontal face bars, horizontal damper blades)
T88	Register (vertical face bars, horizontal damper blades)

20 standard sizes

10x6	12x12	24x12	30x18	36x30
10x8	18x6	24x18	30x24	48x24
12x6	18x12	24x24	36x18	48x30
12x8	18x18	30x12	36x24	48x36

hen you order

you money, too!"

T&B VENTILATING REGISTERS (No. 7908)

23 standard sizes

6x4	8x6	8x8	18x8	24x12
8x4	10x6	10x8	10x10	14x14
10x4	12x6	12x8	12x10	16x16
6x6	18x6	14x8	12x12	18x18
		16x8	18x12	24x24

T&B AEROFUSE CEILING DIFFUSERS — **Standard Sizes**

(supply duct dia. = listed size in inches)

Adjustable Pattern	
Type PA	6-8-10-12-14-16-18
Fixed Pattern	
Type PS, stepped down	6-8-10-12-14-16-18
Type PF, flush	6-8-10-12-14-16-18
Type PR, supply and return	6-8-10-12-14-16-18
Type PH, half-round	6-8-10-12-14-16
Type D, square	6-8-10-12
Type ES, stepped down	6-8-10-12-15-18-22
Type S, flush	6-8-10-12-15-18-21

Dampers, grids and other accessory equipment available in standard sizes for use with the above Aerofuse Ceiling Diffusers.

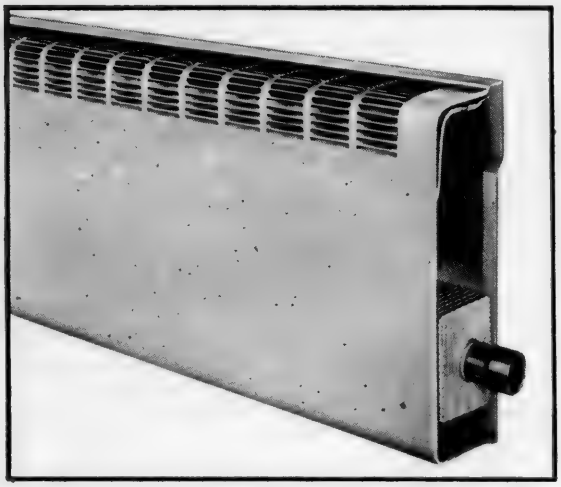
I'd suggest . . .
get in touch with your nearest Tuttle & Bailey Representative and discuss with him *T&B standard sizes.* See for yourself how they can help you get your next job completed faster . . . and save you money, too.

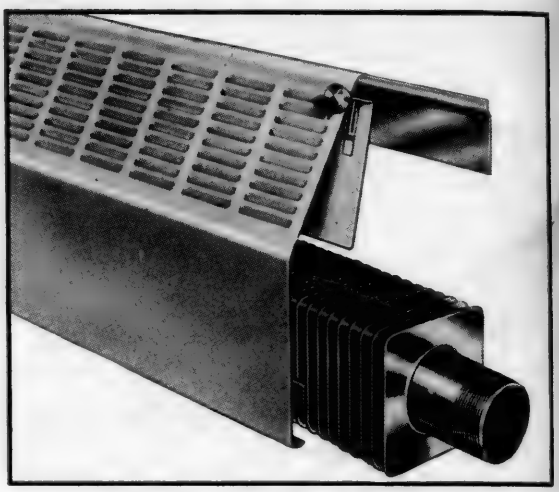
TUTTLE & BAILEY

Division of Allied Thermal Corp. New Britain, Connecticut

CRANE

NOW...two types of high-capacity commercial radiation from Crane





1. COPPER Tube Sunnywall

(copper tube with aluminum fins)

- eight types of heating elements in seven lengths (heating capacities of 700 to 2900 Btu per lineal foot)
- five enclosure styles in six colors
- overlapping sleeves eliminate need for cutting enclosures
- sized-to-mate ends reduce installation costs
- exclusive corrugated aluminum fins provide more heating surface—double rigidity.

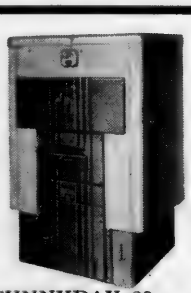
2. STEEL Tube Sunnywall

(steel tube with steel fins)

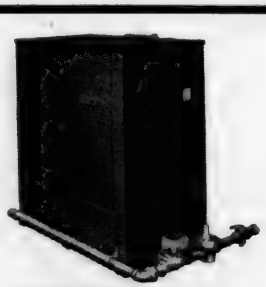
- five types of heating elements in seven lengths (540 to 3280 Btu per lineal foot capacity)
- three enclosure styles (sloping front, flat top and expanded metal) from 2′ to 8′ lengths in increments of 3″
- curved elements (and other special types) available on order
- exclusive hub design on fins gives maximum conductance between tube and fin

Full line of accessories and optional equipment makes it possible for copper or steel Sunnywall radiation to fit any installation

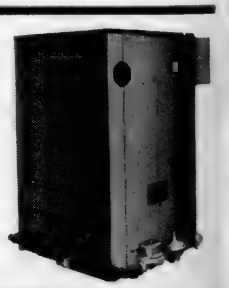
TEAM UP SUNNYWALL WITH THESE HIGH-CAPACITY CRANE SUNNYDAY BOILERS



SUNNYDAY 30
268,000 to 1,367,000 Btu/hr. gross IBR output

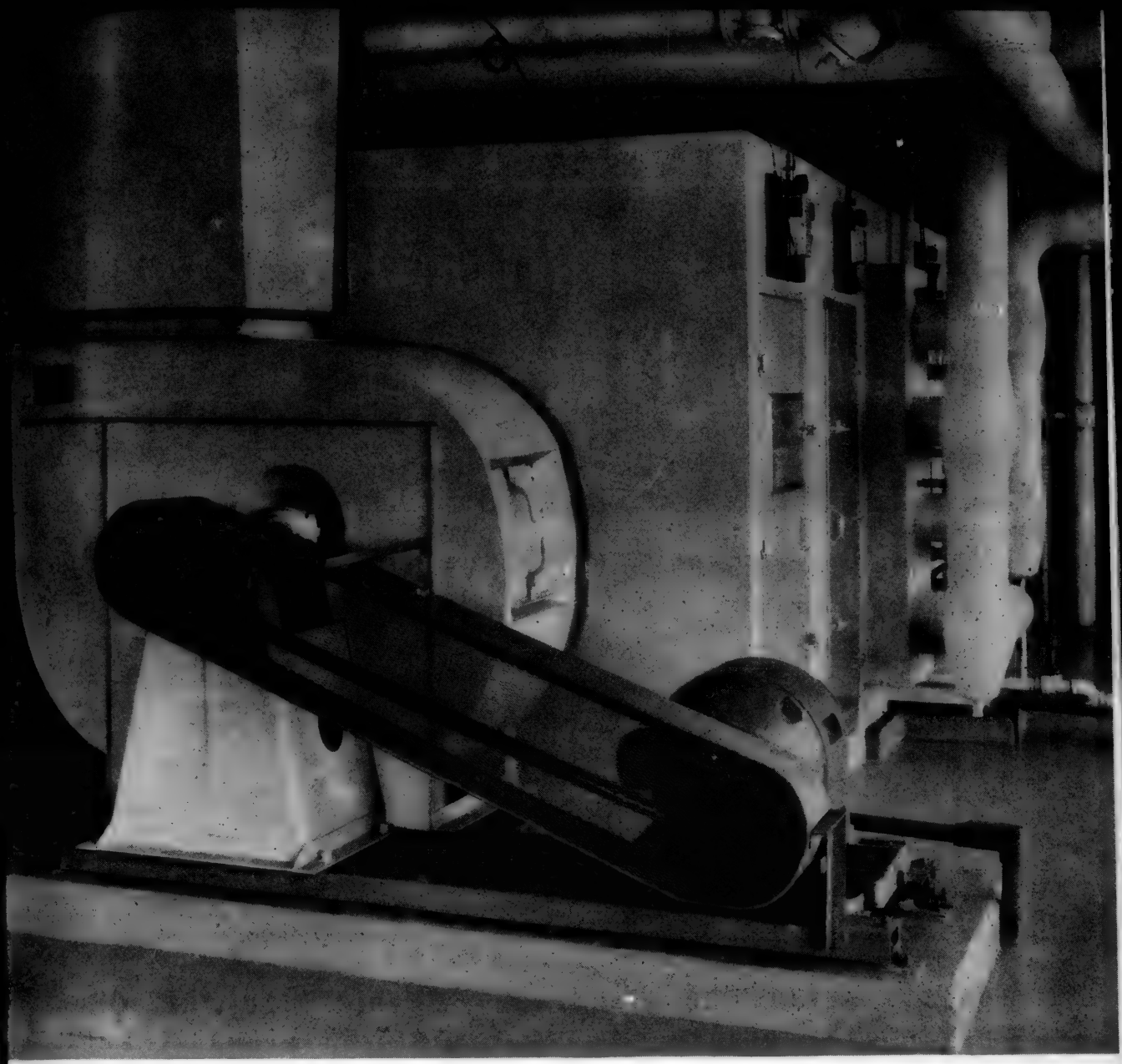


SUNNYDAY 40
350,000 to 2,380,000 Btu/hr. AGA input



SUNNYDAY 60
625,000 to 5,000,000 Btu/hr. AGA input

CRANE CO. 836 South Michigan Avenue, Chicago 5 · VALVES · FITTINGS · PIPE · PLUMBING · KITCHENS · HEATING · AIR CONDITIONING



IT'S
INSTALLED PERFORMANCE
THAT COUNTS

– and that's exactly what "Buffalo" Type "BL" Fans are delivering in hundreds of major installations

Since their introduction four years ago, many thousands of these Type "BL" Fans have gone into industrial, commercial and institutional jobs to justify every performance claim — and then some! In this time, they have demonstrated their low noise level in hospitals — their endurance and efficiency in heavy-duty industrial applications — their stability under broad variations of pressure and volume requirements. In short, "BL" has proven over and over to be the wise choice for the big Class I air handling jobs.

Check the "Q" Factor* design of the "BL" that assures this top performance — write today for Engineering Bulletin F-101.

**The "Q" Factor — the built-in Quality which provides trouble-free satisfaction and long life.*

Dependable air handling service on central system air conditioning is assured by "Buffalo" Type "BL" Fans. Non-overloading, low in noise level and stable over the entire operating range.

"Buffalo" Type "BL" Limit-Load Fans supply efficient, reliable ventilation for many of Florida's finest "Gold Coast" resorts, as well as large plants and institutions everywhere.

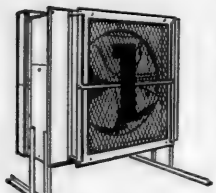
BUFFALO FORGE COMPANY
BUFFALO, N. Y.

Canadian Blower & Forge Co., Ltd., Kitchener, Ont.

VENTILATING · AIR CLEANING · AIR TEMPERING · INDUCED DRAFT · EXHAUSTING
FORCED DRAFT · COOLING · HEATING · PRESSURE BLOWING

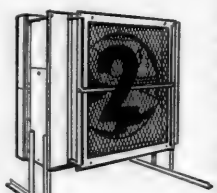
ONLY KRAMER UNICON + WINTERSTAT* GUARANTEES ALL 4

MAXIMUM LIQUID PRESSURE AT EXPANSION VALVE IN WINTERTIME



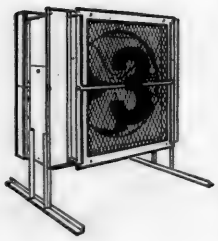
Only the Kramer UNICON plus WINTERSTAT guarantees the full refrigerant pressure *at the expansion valve* for full cooling capacity — even at below 0°F outdoors — *automatically!*

MAXIMUM SUMMER CAPACITY WITH PATENTED WINTERSTAT



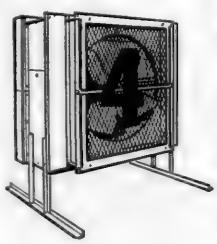
Only Kramer UNICON plus WINTERSTAT guarantees maximum condensing capacity in summer. In hot weather, the patented WINTERSTAT is out of the refrigerant circuit, permitting normal drainage from the condenser without restriction. This assures maximum condensing capacity in summer — *automatically!*

PROMPT DEFROSTING AT ANY OUTDOOR TEMPERATURE



The use of UNICON plus WINTERSTAT makes Kramer THERMOBANK the only low temperature system that can guarantee operation and complete defrosting at any outdoor temperature—even 0°F or lower — *automatically!*

IMMEDIATE COMPRESSOR START-UP REGARDLESS OF OUTDOOR WINTER TEMPERATURE



Only Kramer UNICON plus WINTERSTAT (using modification #1) ensures positive and immediate compressor start-up with pressurestat operating the system, regardless of outdoor winter temperatures at the UNICON and regardless of length of compressor lay-off — *automatically!*

**UNICON is a remote type air-cooled condenser WINTERSTAT is a year 'round automatic head pressure control*

WRITE FOR BULLETIN U-210-L

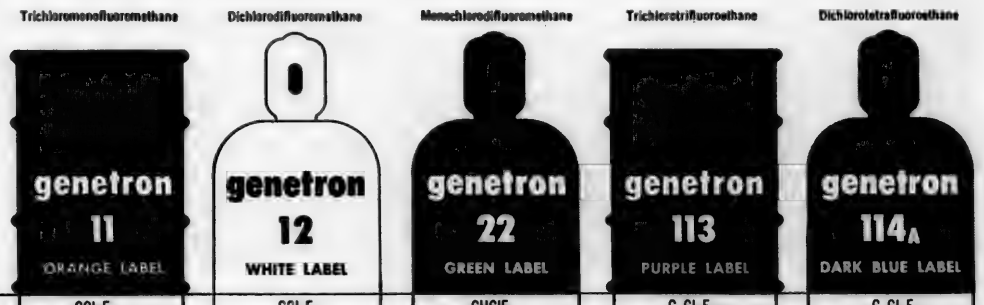
KRAMER TRENTON CO. • Trenton 5, N.J.

44 YEARS OF CONTINUOUS ACHIEVEMENT IN HEAT TRANSFER

Jenni Genetron says,

"HERE'S THE RIGHT REFRIGERANT FOR EVERY NEED!"

genetron® SUPER-DRY REFRIGERANTS



Selected Physical Data
(Performance based on 5°F evaporator temperature and 86°F condenser temperature)

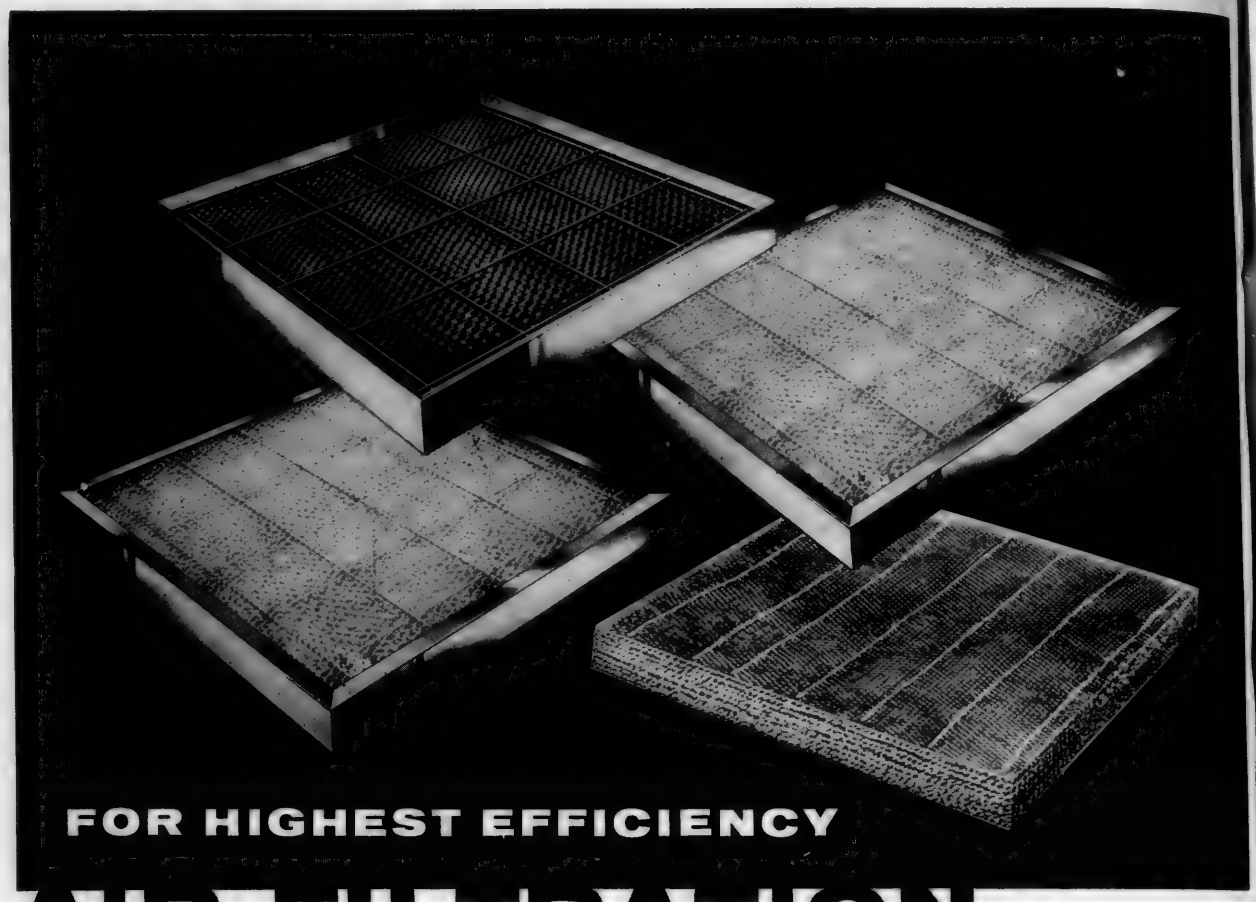
	Trichloromonofluoromethane	Dichlorodifluoromethane	Monochlorodifluoromethane	Trichlorotrifluoroethane	Dichlorotetrafluoroethane
Chemical Formula	CCl_3F	CCl_2F_2	$CHClF_2$	$C_2Cl_3F_3$	$C_2Cl_2F_4$
Molecular Weight	137.4	120.9	86.5	187.4	170.9
Boiling Pt. (°F) at 1 Atm. Pressure	74.7	—21.6	—41.4	117.6	37.6
Evaporator Pressure at 5°F (p.s.i.g.)	24.0*	11.8	28.3	27.9*	15.6*
Condensing Pressure at 86°F (p.s.i.g.)	3.6	93.3	159.8	13.9*	22.7
Freezing Point (°F) at 1 Atm. Pressure	—168	—252	—256	—31	—76
Critical Temperature (°F)	388	234	205	417	294
Critical Pressure (p.s.i. absolute)	635	597	716	495	478
Compressor Discharge Temperature (°F)	112	101	131	86	88
Compression Ratio (86°F/5°F)	6.24	4.08	4.06	8.02	5.33
Specific Volume of Saturated Vapor at 5°F (cu. ft./lb.)	12.27	1.46	1.25	27.04	4.04
Latent Heat of Vaporization at 5°F (B.t.u./lb.)	84.0	68.2	93.6	70.6	60.2
Net Refrig. Effect of Liquid—86°F/5°F (B.t.u./lb.)	67.5	50.0	69.3	53.7	43.0
Specific Heat of Liquid at 86°F (B.t.u./lb.°F)	0.21	0.24	0.34	0.22	0.23
Specific Heat of Vapor at Constant Pressure of 1 Atm. & 86°F (B.t.u./lb.°F)	0.13	0.15	0.15	0.15	0.16
Specific Heat Ratio at 86°F & 1 Atm. (k=Cp/Cv)	1.14	1.14	1.18	1.09	1.01
Coefficient of Performance	5.09	4.70	4.66	4.92	4.60
Horsepower/Ton Refrigeration	0.927	1.002	1.011	0.960	1.025
Refrigerant Circulated/Ton Refrig. (lbs./min.)	2.96	4.00	2.89	3.73	4.65
Liquid Circulated/Ton Refrig. (cu. in./min.)	56.0	85.6	68.0	66.5	88.7
Compressor Displacement/Ton Refrig. (c.f.m.)	36.32	5.83	3.60	100.76	18.78
Toxicity (Underwriters' Laboratories Group No.)	5A	6	5A	4-5	6
Flammability & Explosivity	None	None	None	None	None

*Inches of mercury vacuum.

COMPARE! Careful control at every step in the manufacture of "Genetron" Super-Dry Refrigerants results in products of highest purity, which are extremely low in moisture content and other undesirable impurities. Quality of current production consistently *surpasses* the rigid manufacturing specifications for these products. Write for important informative folder "Genetron Super-Dry Refrigerants."

SEE YOUR WHOLESALER
or write or call
genetron DEPARTMENT
GENERAL CHEMICAL DIVISION
ALLIED CHEMICAL & DYE CORPORATION
40 Rector Street, New York 6, N. Y.

Allied Chemical



FOR HIGHEST EFFICIENCY

AIR FILTRATION

RP AIR FILTERS

FOR RESIDENTIAL, COMMERCIAL, INDUSTRIAL APPLICATIONS

EZ KLEEN

The aluminum, washable air filter that features easy cleaning and moderate cost. Standard E Z Kleen in ½″, 1″ and 2″ thicknesses—350 F.P.M. rating. Multi-Velocity E Z Kleen in 1″ and 2″ thicknesses—520 F.P.M. rating. Easily washed and re-coated with Filter-Coat (dust and dirt removing adhesive) or Super Filter-Coat (dust and odor removing adhesive) for like-new efficiency.

GREASE FILTER

Aluminum grease filters for kitchen exhaust systems. End grease nuisance and resulting costly maintenance to motor and blower equipment...reduce fire hazard ...increase sanitation. Attractive aluminum improves kitchen appearance. Strong, lightweight, easy-to-handle.

INDUSTRIAL FILTER

Economical, lightweight, easy-to-clean, aluminum filters for both high or low velocities. Reduce operating costs through longer service life and top performance. Ideal for new or existing installations.

PAINT ARRESTORS

Inexpensive, disposable filter pads that remove paint overspray solids from exhausted air in paint spray booths. Simple installation, using holding frames, in banks of any size. R P Paint Arrestors are efficient in operation...versatile...economical in operating and initial costs...save floor-space...reduce down-time.

WRITE FOR COMPLETE INFORMATION

RP ... PRODUCTS OF RESEARCH

RESEARCH PRODUCTS Corporation

Dept. 47 Madison 10, Wisconsin

IF IT'S A "MOTORPUMP" IT HAS A BUILT-IN

Reputation

One sure way to minimize costly call-backs on air conditioning pump installations is to start out with a unit you *know* will stand up on the job without need for excessive maintenance.

By standardizing on Ingersoll-Rand Motorpumps you are offering your customers modern, efficient pumps designed specifically for air conditioning systems. Today, on all types of installations, thousands of Motorpumps are delivering the maximum in efficient, trouble-free operation.

Ingersoll-Rand
11 Broadway, New York 4, N.Y.

Motorpumps are available from ¼ to 75 horsepower. Write for our latest literature covering the Motorpump for air conditioning service.

9-594

Glasfloss Air Filters prevent ink mist and paper dust from entering motors on these high speed presses, reduce motor maintenance, and fire hazard.

Building damage and fire hazard from ink condensation and penetration is now greatly reduced with Glasfloss Air Filters. Disposable filters are replaced regularly.

Glasfloss* Air Filters lessen press maintenance, reduce ink mist hazard at Rochester Times Union

The Rochester Times Union, Rochester, N.Y., had two serious problems common to most newspaper plants, according to Mr. Arnold J. Cunningham, the newspaper's building superintendent.

1. Ink mist and paper dust from 15 press-unit drive motor intakes required the cleaning of internal motor parts every three months. This caused production delays, and thorough cleaning was not always possible.
   Solution: Glasfloss Fiber Glass Air Filters were installed on special frames. Now motor cleaning is done only once every six to eight months, and less time is required. Light vacuuming of filter faces daily allows maximum air intake. Motor operating temperatures are lower and a fire hazard is reduced.
2. Ink condensing inside the air ducts created an extreme fire hazard and ink-spot damage to ceilings and equipment. Paper dust caused extreme surface loading and this impeded the passage of ink mist through the filter.
   Solution: After extensive testing of many filtering devices, Glasfloss Filters proved to be the most satisfactory. Through regular rotation and replacement of filters, the fire hazard has been greatly reduced. Building damage from ink condensation and penetration is very slight. Filtering costs are at a minimum.

*Trademark

GLASFLOSS AIR FILTERS CAN HELP YOU, TOO!

Pittsburgh Glasfloss Air Filters are made from fine, soft fiber glass which provides a greater, more efficient dirt-and-dust-collecting area. Glasfloss Filters are soft and easy to handle; this fiber glass will not splinter or pierce the skin.

Get top results with Glasfloss Air Filters. Write for the name of your nearest Glasfloss distributor. *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Pennsylvania.*

GLASFLOSS FILTERS ARE A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh and St. Louis

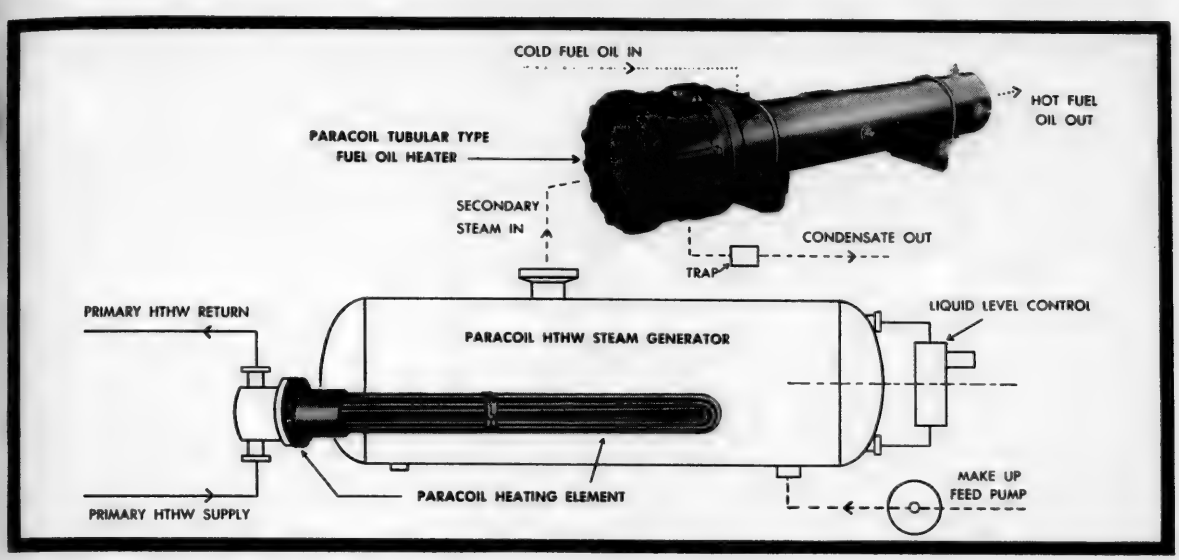
FIBER PG GLASS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY

CUT ALONG DOTTED LINE AND SAVE

Idea no. 1 from Paracoil



How to use secondary steam to pre-heat no.6 oil in a High Temperature Hot Water system

Paracoil engineers know that the first consideration in the design of an oil preheating system for an HTHW installation must be absolute freedom from the possibility of oil leak contamination of the main HTHW stream. A completely isolated oil preheater circuit is recommended. This can be accomplished by means of a secondary heat transfer circuit that does the actual heating. In this way, only the secondary circuit is exposed to possible contamination — the main HTHW circuit is protected at all times.

One of the ways that this isolation is achieved is illustrated above. Additional isolation circuits will be commented upon in future "Idea Sheets". Watch for them!

How to design a protective circuit

1. **Install a steam generator.** Use a Paracoil Heating Element with the HTHW main energy stream as its heat source. With water at 350° F, steam at 25 psig (267° F) can be easily generated in an economically sized unit.
2. **Use the steam thus generated** . . . to heat the fuel oil in a Paracoil Tubular Oil-Type Fuel Oil Heater.* This type heater provides the highest rate of heat transfer — more than **three times** that of the conventional straight tube type.
3. **The condensate from the oil heater** . . . may be returned to the steam generator or sent to waste depending upon plant policy. If the re-use of the condensate is important, absolute surety of its quality can be obtained through the use of the Paracoil Oil Leak Condensate Inspection System.*

Paracoil engineers have designed and built many oil preheater protective systems for both stationary and marine installations. They now offer their experience and know-how to all who are involved in HTHW activities.

Write for complete data.

DAVIS ENGINEERING CORPORATION

30 Rockefeller Plaza, New York 20, New York • Circle 6-5650

CUT ALONG DOTTED LINE AND SAVE

In 1907 ST. BONIFACE HOSPITAL Pioneered with

ST. BONIFACE HOSPITAL, located across the Red River from Winnipeg, Man., is one of the largest hospitals in Western Canada. It was built and is operated by the order of the Grey Nuns of Montreal.

Architects and Engineers:
GREEN BLANKSTEIN RUSSELL & ASSOCIATES, Winnipeg, Man.

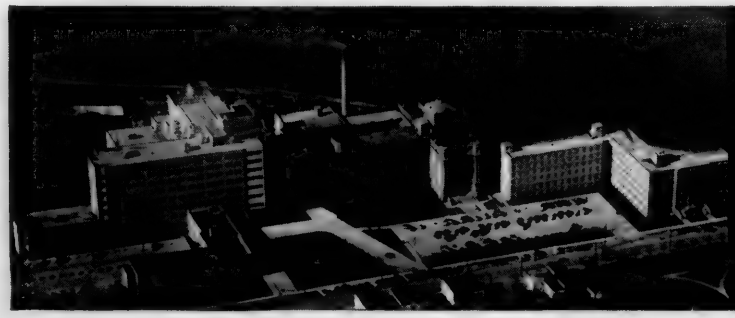
Air Conditioning Engineers:
CARRIER ENGINEERING LTD.

Plumbing & Heating Contractors:
New Wing, **BOWYER-BOAG LTD.**

Old Section and Nurses Residence,
MIKKELSEN-COWARD & CO. LTD.

Cobalt 60 Unit above is one of the many features in the completely equipped Radiology department. It is a high energy source, for treatment of cancer and other malignancies.

In the Board Room, left to right, Dr. Paul L'Heureux, Medical Director, Sister Superior G. Jarbeau, Administrator and her Assistant Sr. A. Trottier, Mr. G. L. Pickering, Comptroller. Below on opposite page is Chief Engineer Louis Verscheure at air conditioning control panel.



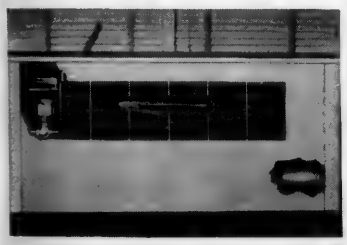
POWERS Pneumatic Temperature Control for Heating

NOW, it's Canada's First Completely Air Conditioned Hospital with

Powers Temperature and Humidity Control helps Nurses to work more effectively and care for more patients. Surgeons operate with less fatigue and strain. Patients recover sooner and require less service.

Powers Pneumatic Thermostats maintain set temperatures constantly. They need no daily checking or readjusting.

Over 619 Powers Heating-Cooling Thermostats and 708 PACKLESS Control Valves regulate the volume of chilled or heated water to unit air conditioners used in the perimeter areas of the buildings.



POWERS

Quality System of Air Conditioning Control

St. Boniface Hospital with 670 beds, offers the most advanced facilities and equipment for diagnosis and treatment of disease, patient care and comfort.

Year 'round Air Conditioning regulated by Powers individual room control provides the right temperature required for every hospital activity. Powers pneumatic thermostats are used in:

13 OPERATING ROOMS, central sterilizing and supply area, recovery and delivery rooms, 9 nurseries, attractive rooms for patients, offices, public spaces, pharmacy, laboratories, radiology and therapy departments, kitchen, cafeteria and dining rooms, laundry, autopsy room, solariums for convalescent patients and a colorful playroom for children.

Central Supply Units furnish properly conditioned primary air and heated or chilled water to over 600 unit air conditioners in the perimeter areas of the buildings. Occupants in each space can dial the temperature they like best.

Interior Zones, operating rooms and other spaces receive conditioned air from central supply units. Here Powers control automatically adjusts temperature and humidity to the requirements of occupancy and outside weather.

Nurses Home and School of Nursing with over 200 students, have direct radiation throughout controlled by Powers.

Powers Thermostatic Shower Controls insure comfort and safety of patients and nurses.

Are You Planning a New Hospital or any other type of building? Ask your architect or engineer to include a Powers Quality System of Temperature Control. You will help insure utmost comfort and lowest cost for upkeep.

THE POWERS REGULATOR COMPANY

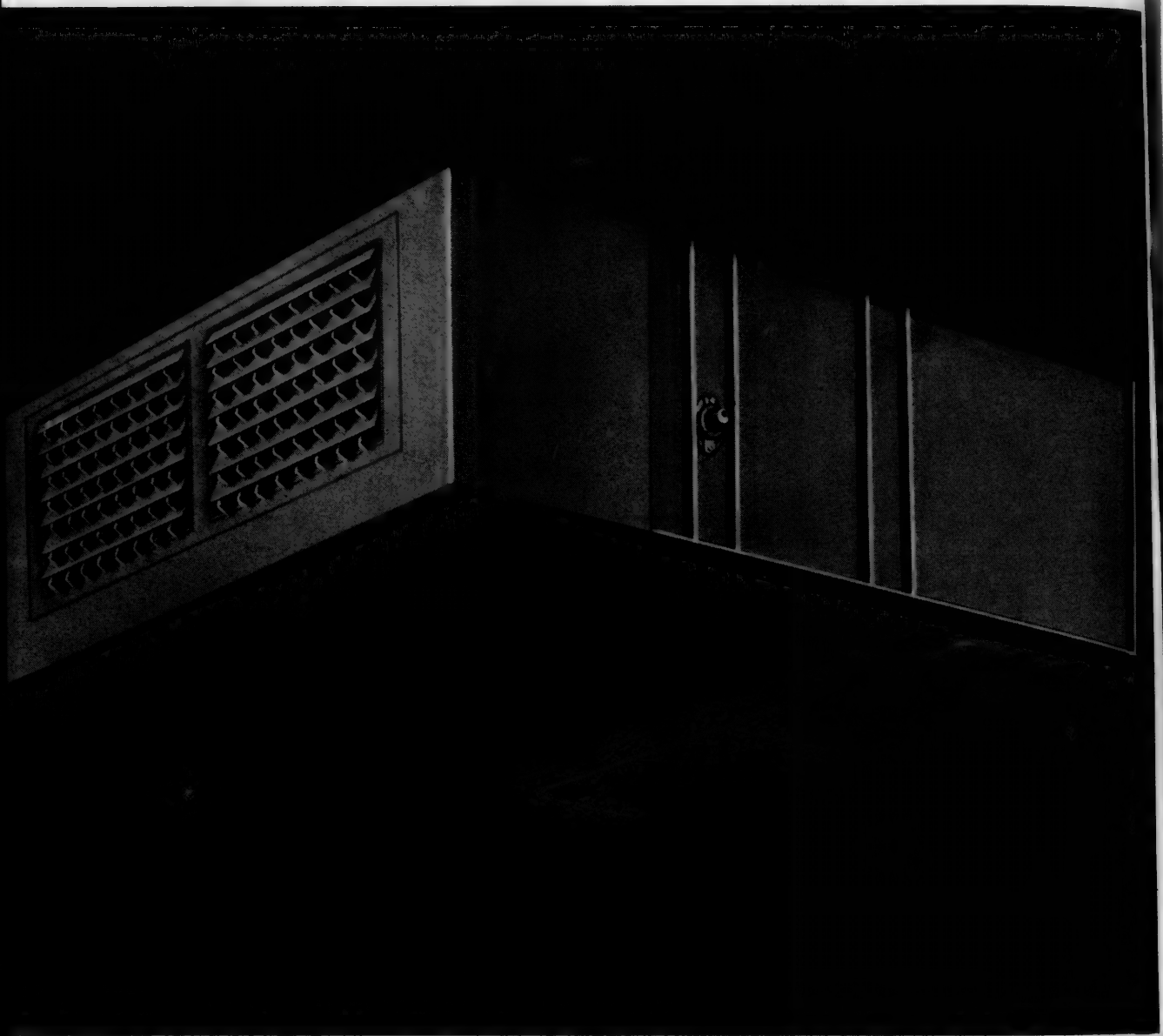
SKOKIE, ILLINOIS | *Offices in chief cities in U.S.A., Canada and Mexico*

65 Years of Automatic Temperature and Humidity Control

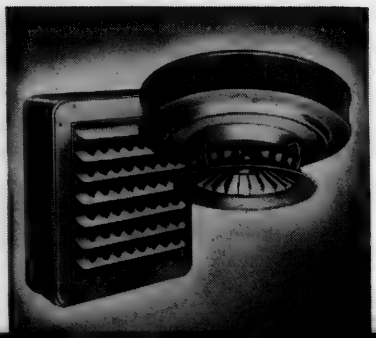
POWERS CONTROL

(C49)

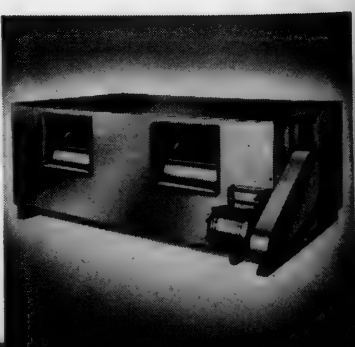
Now! Heating, ventilating ... with a versatile T



FOR SPOT HEATING, TRANE Horizontal and Projection Unit Heaters put the heat where you want it! TRANE exclusive diffusion features give you any selection of heating patterns.



YEAR-AROUND COMFORT! TRANE Climate Changers provide heating or cooling—or both. The multi-zone model provides separate climates for as many as six zones—*at the same time!*



...in any combination Trane Torrivent!

Heat, filter and blend a king-size volume of air for any institutional, commercial or industrial job

The versatile TRANE Torrivent permits you to heat and mix any desired combination of outside and recirculated air to provide just the amount of heating-ventilating you need. Use it with or without ducts; install it on the floor, ceiling or wall—*anywhere* you need a dependable source of warmed, filtered, humidified and tempered air for heating, ventilating or industrial processing.

Next time you're faced with a heating-ventilating job for any kind of building, make it a TRANE Torrivent. There's a complete range of nine sizes to 33,000 cfm. For complete facts on the Torrivent, see your nearby TRANE Sales Office — or write TRANE, La Crosse, Wisconsin.

Check these Torrivent Features:

• **QUIET!** New, high-efficiency TRANE Fans have low outlet velocities for smooth, quiet operation.

• **VERSATILE!** Torrivents heat, filter, blend any combination of recirculated and outside air. May be used with or without duct work; install on floor, wall or ceiling. Discharge plenum with exclusive TRANE Diffusers or swivel nozzles permit an infinite number of discharge patterns.

• **FLEXIBLE!** Complete range of coil types and sizes; wide choice of filter box, mixing box, plenum and nozzle combinations.

• **WIDER RANGE!** Nine sizes—1, 2 and 3-fan models —from 1,250 to 33,000 cfm.

• **LONGER LIFE!** Casing is uniframe construction, with heavy gauge phosphatized steel. Fan shafts are solid (not hollow); large diameter for less vibration. Fan bearings are mounted *externally* for easy, simplified maintenance.

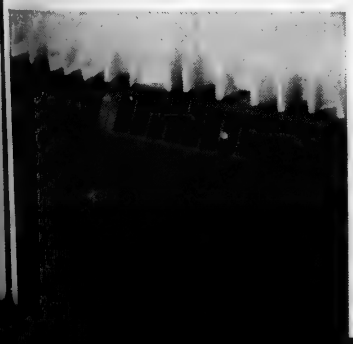
• **LOWER COST!** Greater coil and fan efficiency and multiple coil choice permit selection of equipment that meets your heating-ventilating requirements *exactly*. No wasted capacity!

For any air condition, turn to

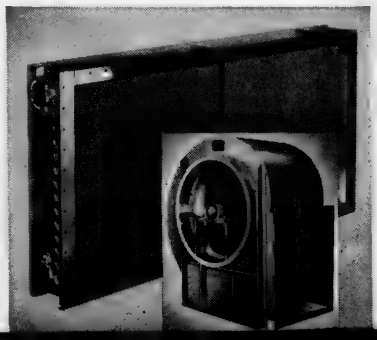
TRANE

MANUFACTURING ENGINEERS OF AIR CONDITIONING, HEATING, VENTILATING AND HEAT TRANSFER EQUIPMENT

THE TRANE COMPANY, LA CROSSE, WIS. • SCRANTON MFG. DIV., SCRANTON, PA. TRANE COMPANY OF CANADA, LTD., TORONTO • 90 U.S. AND 19 CANADIAN OFFICES



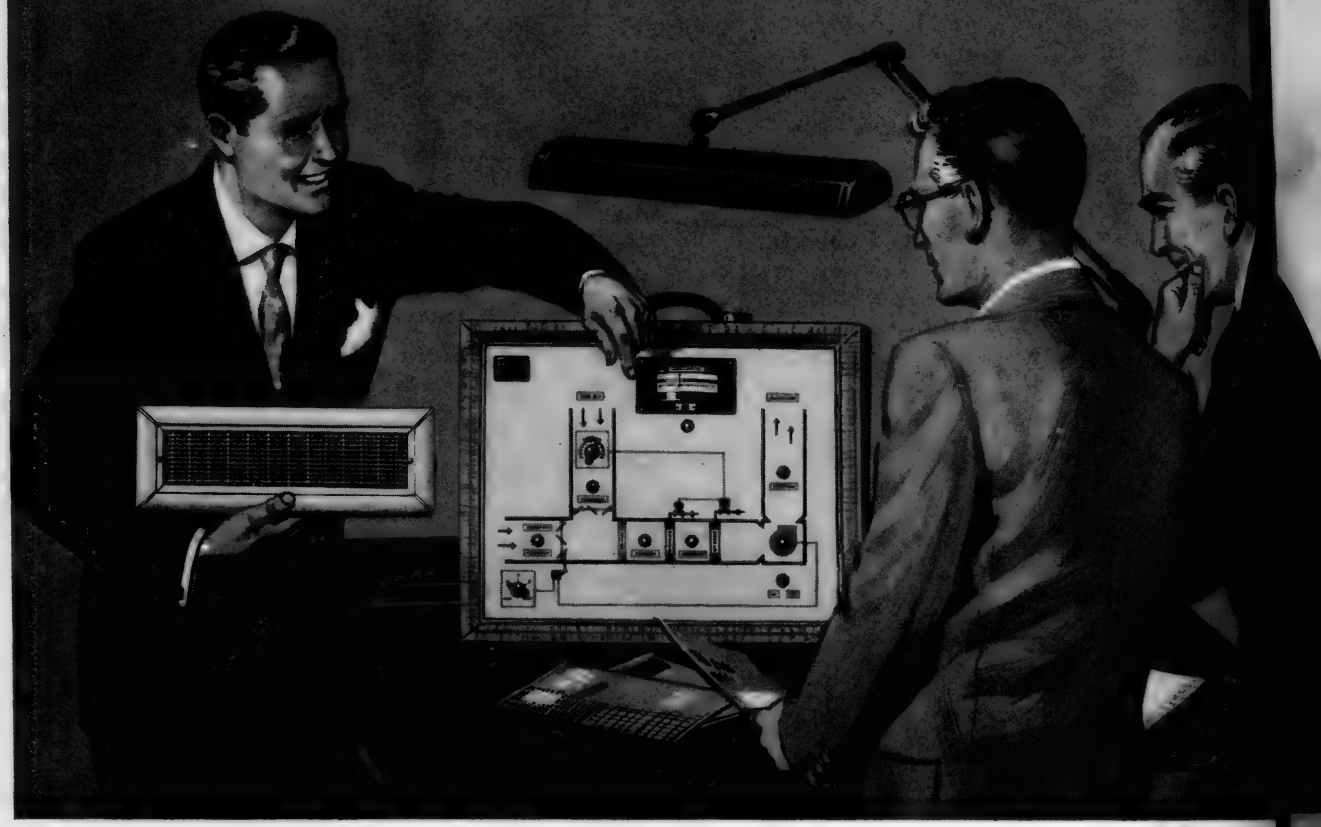
CUSTOM STYLING with production models! New, trim TRANE Wall-Fin is precision built. Closures stay trim and attractive for years due to extra reinforcements at key points.

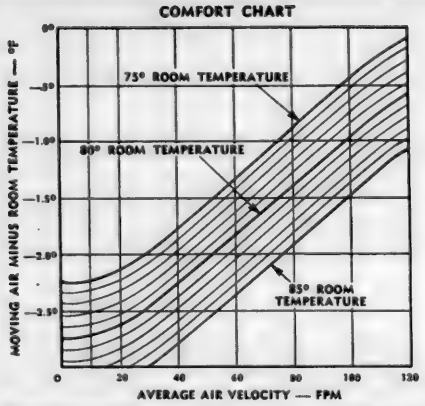


FOR "BUILT-UP" SYSTEMS, TRANE precision-built Fans and Delta Flo Coils step up efficiency of system. Exclusive TRANE Delta Flo Fin provides increased heat transfer efficiency.

BARBER COLMAN

one source
one responsibility. . . . . .





COMFORT STANDARDS

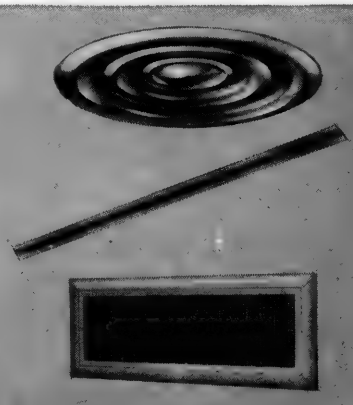
Barber-Colman engineers have developed a Comfort Chart illustrating the proper relationship between air velocities and air temperatures necessary for human comfort. This chart, shown at the left, serves as a criterion for rating the performance of Barber-Colman automatic control and air distribution products. It indicates conditions of air movement and temperature in the occupancy zone. The line shown for each average room temperature is the limit of satisfactory comfort conditions. All points below the line represent uncomfortable conditions while those above the line fulfill Human Comfort Standards. As the *one source* for *both* temperature control and air distribution products, the Barber-Colman man can assure the proper relationship of temperatures and velocities as dictated by this chart.

. . for your Automatic Controls and Air Distribution Products

Yes, Barber-Colman is prepared to give you a combination of *both* temperature control and air distribution, selected and adjusted for ideal comfort! A complete line of superior-quality equipment, coupled with a nationwide field organization experienced in the selection and application of Automatic Control and Air Distribution equipment, is quickly and easily available. The Barber-Colman man assumes the responsibility for selection and placement of equipment and is available for supervision of installation and final balancing of the combination system. More and more of these system combinations are being furnished by Barber-Colman as the solution to problems resulting from an ever-changing architectural concept and the demand for higher comfort standards. Phone your nearby Barber-Colman field office for a discussion of how you can benefit from this highly logical trend.

This new fully illustrated bulletin details advantages of the complete temperature control and air distribution system combinations available through the one source and one responsibility of Barber-Colman. Write for your copy of Bulletin F8326.

Barber-Colman Electronic Automatic Controls and Uni-Flo Engineered Air Distribution Products are the result of extensive research, laboratory tests, and field experience. Accurate, comprehensive engineering data are available for each of these products. You may use them confidently.



BARBER-COLMAN COMPANY

Dept. U, 1602 Rock Street, Rockford, Illinois

IRON FIREMAN
SelecTemp®
HEATING

THERMOSTAT
AIR HEATING FILTERING AND CIRCULATING UNIT
Each individual room heater is a fully automatic unit containing a steam heating core, air filter, forced air blower with steam turbine drive, and non-electric thermostat, all packaged into a compact steel housing with an attractive grille face. Unit is recessed into the wall, with only the grille extending beyond the wall surface.
COPPER TUBING
Low initial cost. Easily installed in either new or old construction. Small copper tubing carries steam to individual room heater units. Substantial savings in installation costs.
STEAM SUPPLY
CONDENSATE RETURN

Heat is accurately regulated in EACH ROOM

Each office, hospital, church, hotel, motel, or school room is a separate heating zone. Each unit continuously regulates heat needed for each room. No special adjustments of dampers, valves or orifices required to balance heating system. Automatically compensates for external heat sources such as fireplace or solar heat, without affecting temperatures of other rooms.

Heating of each room is controlled by occupant Individual comfort is assured because the occupant can set thermostat at any level desired.

Present steam systems converted easily to SelecTemp. Frequently, existing boiler and steam mains can be used. Cumbersome radiators are replaced with compact SelecTemp wall heating units. Ideal for use with boilers fired by gas, oil, coal, or with district steam.

Heat saved when rooms are unoccupied. Temperatures can be lowered in unoccupied rooms, which can be quickly reheated when needed. Motel and hotel owners, for example, say Iron Fireman heating the finest ever devised. It cuts fuel costs and pleases guests.

A thermostat in every room. Every type of building or home can now have individual room temperature control, at a cost comparable to that of many steam or hot water systems which do not make each room a separate heating zone.

Architects and heating engineers readily recognize that Selectemp heating solves many stubborn heating problems. Now you can actually heat a building to please everyone. Room occupants enjoy a new standard of comfort, regardless of the building's exposure to cold winds, heat from the sun—or the number of people in the room.

A heating engineer (who expressed skepticism at first), wrote as follows, after a winter's experience with SelecTemp in his own office:

"We have experienced sub-zero temperature with high winds. Our office has been held at an ideal temperature, with almost no variation up or down. We now consider this SelecTemp system the most marvelous and satisfactory heating installation we have ever seen, and expect to specify it in many of our own jobs."

Continuous, *modulated* heat. Air circulation is continuous. Both temperature and volume of air are automatically modulated, as required, to offset heat loss from each room.

For full information write Iron Fireman Mfg. Co., 3355 W. 106th St., Cleveland 11, Ohio. (In Canada, please address Iron Fireman Mfg. Co. of Canada, Ltd., 80 Ward Street, Toronto, Ontario).

THE IRON FIREMAN

IRON FIREMAN.
Engineered HEATING AND COOLING

NEW TISHMAN BUILDING
3325 Wilshire Boulevard
Los Angeles, California

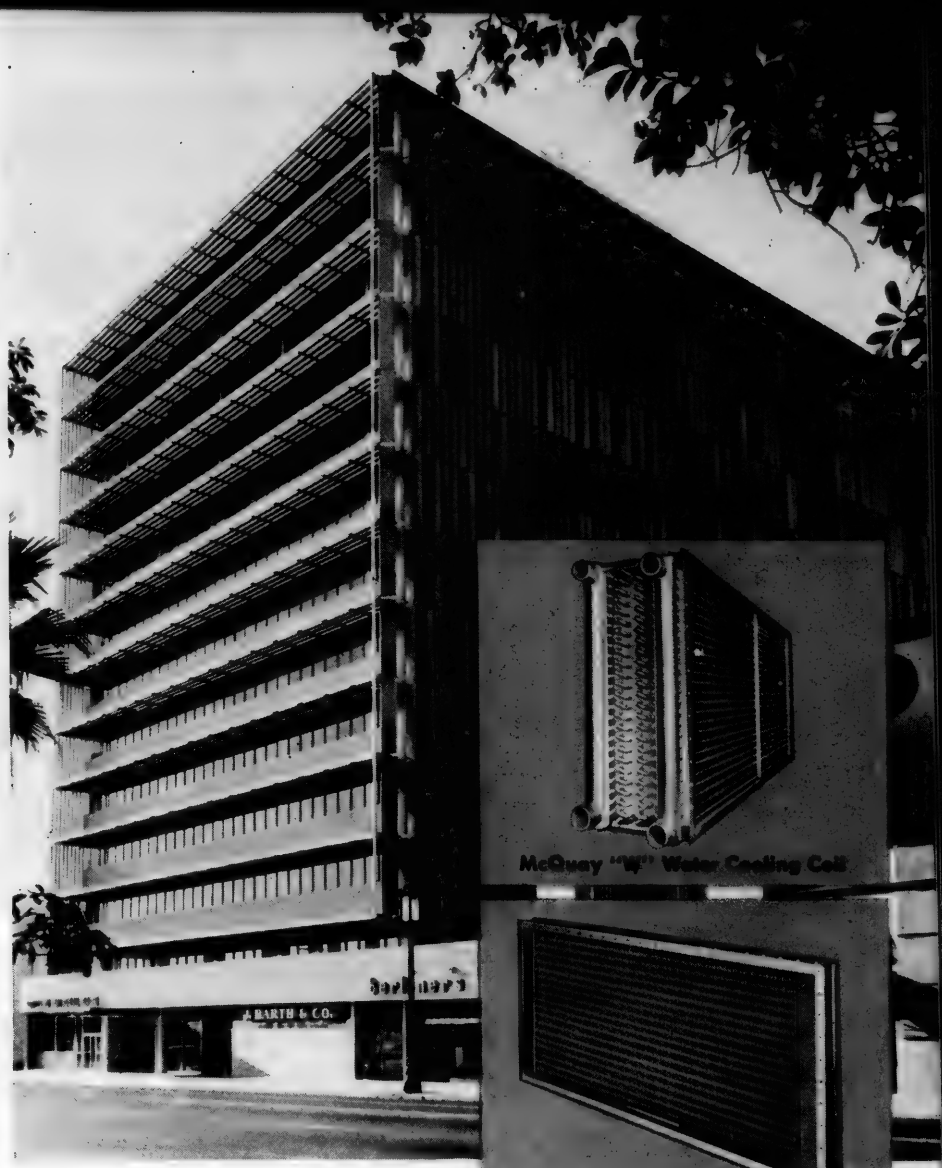
Air Conditioned

OF COURSE

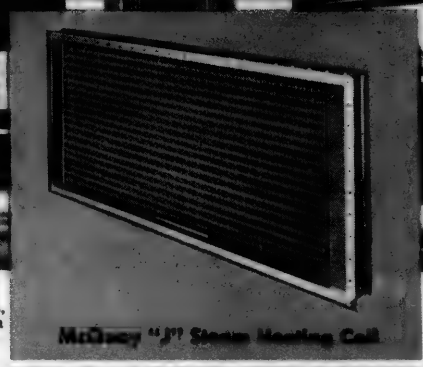
with 35

McQuay

RIPPLE FIN COILS



McQuay "W" Water Cooling Coil



McQuay "J" Steam Heating Coil

ARCHITECT ..... Victor Gruen Associates, Beverly Hills, California

MECHANICAL ENGINEER ..... Ralph E. Phillips, Inc., Los Angeles, California

MECHANICAL CONTRACTOR .... J. Herman Co., Inc., Los Angeles, California

The new, completely air conditioned Tishman Building is an example of the versatility of McQuay heating and cooling coils, as it was necessary to design this flexible system so that it would meet the space requirements of future tenants as the building became leased. McQuay heating and cooling coils were used in central supply systems located on every other floor which supply hot and cold air to a duct system which passes through the central part of the building. As floor space was rented, lateral duct run-outs were installed to precisely and economically serve the areas occupied. There is a McQuay heating or cooling coil to exactly meet the requirements of every heating, cooling or air conditioning job—and do it efficiently and economically with the lowest possible investment. Years of experience, years of research provide the know-how for which McQuay is famous.

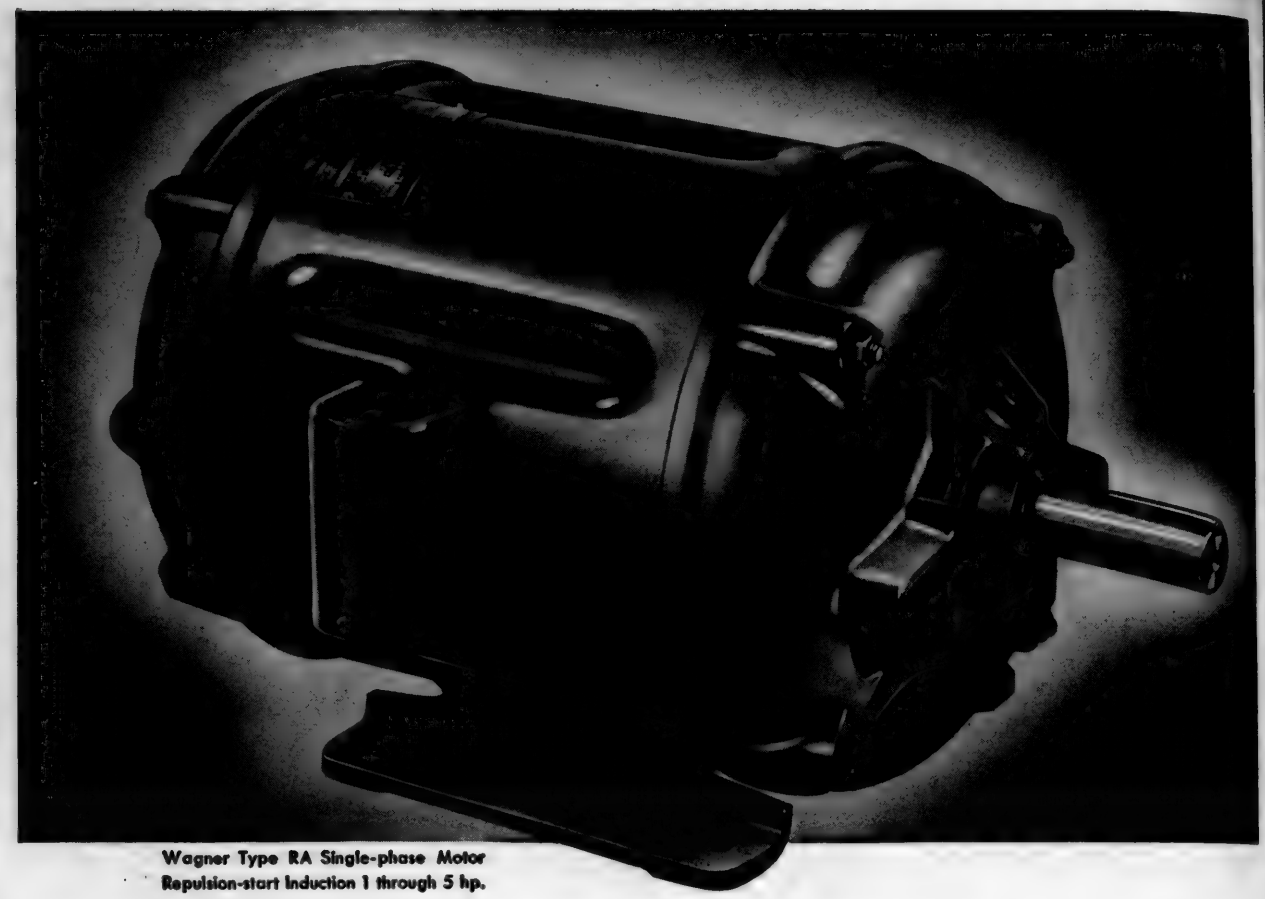
McQuay "W" water cooling coils also utilize the famous Ripple Fin and staggered tube construction. Extremely flexible to expansion and contraction with supply and return connections at one end, for long life and simplified piping and service. Also available in a wide variety of sizes, styles and capacities, 1 to 10 rows. 23 McQuay "W" coils were used on the Tishman system.

McQuay "J" Steam heating coils have the exclusive Ripple Fin and staggered tube construction. Designed for use on heating, ventilating and special process applications, and are especially suitable for modulated steam control with uniform discharge temperatures. Extremely flexible under expansion and contraction. Made in a wide variety of sizes, styles and capacities to meet the requirements of every application. 12 McQuay "J" coils were used on the Tishman system.

McQuay INC.

REFRIGERATION
HEATING
AIR CONDITIONING

McQuay Means Quality



Wagner Type RA Single-phase Motor
Repulsion-start Induction 1 through 5 hp.

NOW...Wagner's high starting torque Integral hp single-phase motor is available in the latest NEMA frame sizes!

The well-known Wagner Type RA Motor is the workhorse of the single-phase motor field. This repulsion-start, induction-run motor combines the best features of the repulsion motor in starting, with those of the induction motor while running at rated operating speeds—ideal for applications requiring high starting torque.

No other single-phase motor has its ability to continually start heavy loads or perform with such complete satisfaction under continuous service.

Specifically designed for compressors, pumps, machine tools, grinders, and conveyors; it is preferred for many other single-phase high inertia or heavy friction starting applications because of its ability to start such loads with low current and with minimum light flicker.

Let a Wagner field engineer show you how these motors can be applied to your needs. Call the nearest of our branch offices, or write us.

OLD FRAME SIZE	NEW FRAME SIZE
203	182
204	184
224	213
225	215
254	254U

4 pole (1750 RPM, 60 cycle and 1450 RPM, 50 cycle) ratings are interchangeable in mounting dimensions with capacitor-start motors of the same ratings.

Wagner Electric Corporation
SERVING INDUSTRY SINCE 1891

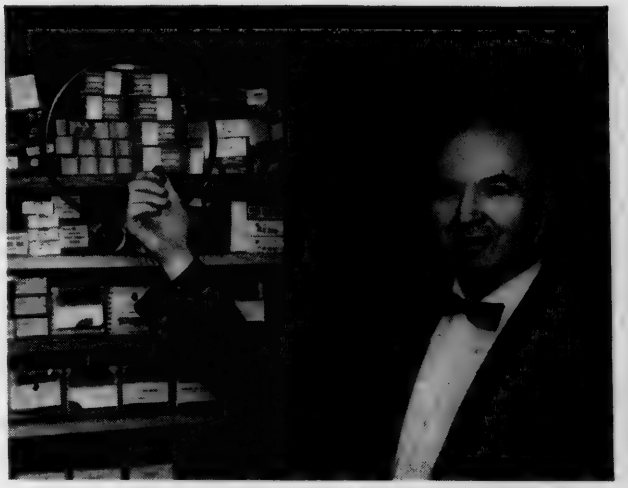
BRANCHES AND DISTRIBUTORS IN ALL PRINCIPAL CITIES

Wagner Electric Corporation
6463 Plymouth Ave., St. Louis 14, Mo., U.S.A.

M57-41

ELECTRIC MOTORS • TRANSFORMERS • INDUSTRIAL BRAKES • AUTOMOTIVE BRAKE SYSTEMS—AIR AND HYDRAULIC

"they're easy and simple to take care of"



"Spare parts for a whole plantful take only a corner of a cabinet."

Q. Mr. Baker*, as Superintendent of Plant and Structures of the Newark Beth Israel Hospital, you've used a good many Yarway Impulse Steam Traps in the last 20 years. What, in your opinion, are their main advantages?

A. The big thing is that they're easy and simple to take care of. In many cases, they can replace traps much bigger and heavier. Then, too, they seldom give us any trouble. Usually we install 'em and forget 'em. When they do need service, replacement of the little valve is the worst that can happen, and that only takes a couple of minutes.

Q. What do your operating men think of Yarway traps?

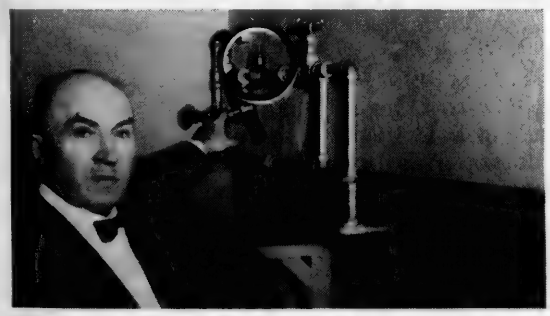
A. Twenty years ago, when the Yarway Impulse Trap was introduced as a new idea in steam traps, it made sense to me and I ordered some. My men, however, insisted they wouldn't work. I finally put on a demonstration on a steam leg down in the boiler room, and they were convinced. Now they are as enthusiastic as I am.

Q. How many Yarway Impulse Traps are installed around the plant?

A. I don't know exactly. They're all over the place. Certainly over 100. We have them throughout the laundry and kitchen, on all the steam tables and coffee urns in the cafeterias, in the operating rooms and Central Supply on sterilizers, autoclaves and stills, in the boiler room on fuel oil heaters, high and low pressure lines, and on steam line drips everywhere in the plant. To service all these, our inventory of spares and repair parts takes, as you can see, only a little corner in a filing cabinet.

Q. We notice a few traps of other makes around. How do you explain that?

A. Well, some equipment gets installed with other traps on it—but first excuse we get, we replace 'em with Yarways!

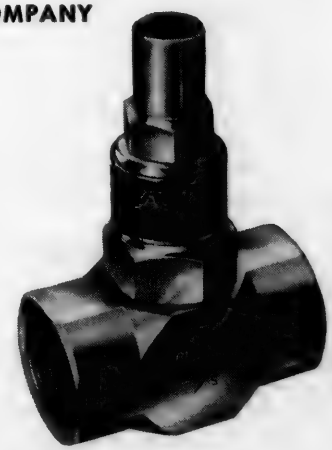


"This Yarway Impulse Trap on drip line replaced a conventional trap that needed a platform to support it."

If you would like a copy of a new, helpful booklet, "The Why and How of Steam Trapping" drop a card to

YARNALL-WARING COMPANY
104 Mermaid Ave.,
Philadelphia 18, Pa.

**GEORGE E. BAKER,*
Supt. Plant and Structures,
Newark Beth Israel Hospital,
Newark, N. J.



YARWAY ... *a good way to specify steam traps*

OVER 1,200,000 YARWAY IMPULSE STEAM TRAPS ALREADY USED • STOCKED AND SOLD BY 275 CONVENIENT LOCAL INDUSTRIAL DISTRIBUTORS • NATION-WIDE YARWAY ENGINEERING STAFF AVAILABLE FOR SERVICE.

When choosing aluminum coiled sheet for heat transfer products, alert manufacturers demand good drawing quality for rapid forming of tube collars without cracking or buckling. Close adherence to thickness and width tolerances are of prime importance in manufacturing costs; and rigid control from casting of billets to finished products is equally important when a highly efficient end-product is desired.

A comforting thought too, is to know that the low-cost, highly efficient product you've made from Fairmont aluminum will give years of use to satisfied customers, because Fairmont aluminum resists corrosion and breakdown.

Along with rigid quality control, Fairmont offers "individualized" attention to manufacturers' requirements for coiled and flat sheet in 1100 and 3003 alloys. Let us show you why Fairmont aluminum is being specified by the foremost heat transfer product manufacturers. Write or call today for details.

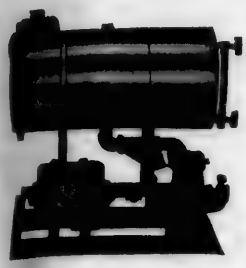
Sales offices in Principal Cities

FAIRMONT ALUMINUM COMPANY

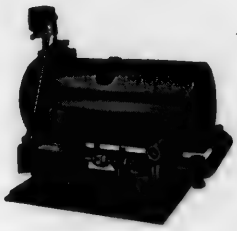
SUBSIDIARY OF CERRO DE PASCO CORPORATION

Dept. AC-2 • FAIRMONT, WEST VIRGINIA

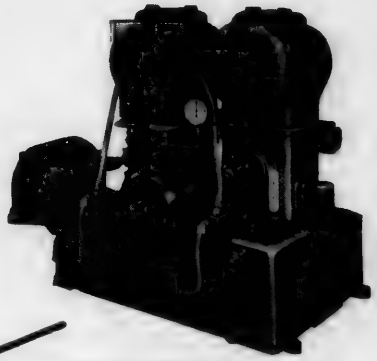
FALCO



TYPE "TM" TURBINE PUMP

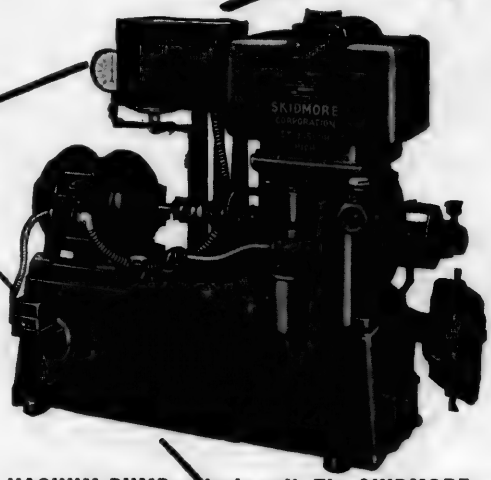


TYPE "HS" CONDENSATE PUMP

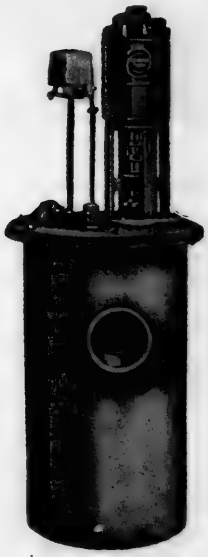


VACUUM PUMP—duplex unit

EFFICIENCY REMAINS CONSTANT— YEAR AFTER YEAR...

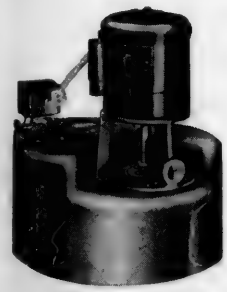


VACUUM PUMP—Single unit. The SKIDMORE Vacuum Pump automatically adjusts itself to the varying conditions of the system. Capacity remains constant without adjustments or expensive repairs.



SKIDMORE TYPE "TM" CONDENSATE PUMP

Send Coupon For Bulletins



TYPE "CVS" VERTICAL PUMP

There's a Skidmore Pump built for every heating requirement.

SKIDMORE CORPORATION

ST. JOSEPH, MICH.

SKIDMORE CORPORATION, ST. JOSEPH 5, MICHIGAN

Please send bulletins on the following pumps checked below.

CVS TM HS UV VACUUM

Name .....

Firm .....

Address .....

City .....**State** .....

FORD ASSEMBLY PLANT. Hundreds of tons of Bethlehem Pipe were used in constructing this Ford Motor Co. plant, Mahwah, N. J. Plumbing and Heating Contractor: August Arace & Sons, Inc., Elizabeth, N. J. Jobber: A. and J. Friedman Supply Co., Inc., Passaic, N. J.

Assembly Plant in New Jersey—
Apartment Building in Baltimore
Both Have Beth-Co-Weld Piping

Whether you plan to install general-purpose pipe in industrial buildings, apartment structures, or some other type of construction, you can be sure of a dependable job with Beth-Co-Weld steel pipe.

Beth-Co-Weld is ideal for general-purpose piping because of its strength and uniformity, and because it is so easy to cut, thread and weld.

Beth-Co-Weld is made by the continuous-weld process, and comes in diameters from ½ in. to 4 in., standard weight and extra strong. Both weights are furnished in 21-ft lengths, plus or minus 1 in., as well as in random lengths. Keep asking for Beth-Co-Weld.

FLAG HOUSE COURTS. This 12-story structure, like its neighbors in a slum clearance project in Baltimore, Md., has Beth-Co-Weld piping throughout. Plumbing and Heating Contractor: Continental Engineers Inc., Decatur, Ga. Pipe Jobber: J. T. Roberts & Bro., Inc., Baltimore.

BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

BETHLEHEM STEEL

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation
Export Distributor: Bethlehem Steel Export Corporation

BETHLEHEM STEEL

DUNHAM-BUSH

'CRV' CONSOLE UNIT

The Dunham-Bush 'CR' line of year 'round room air conditioners is available in cabinet or recessed models; vertical or horizontal models; combination water cooling and heating coils; combination direct expansion and steam coils; three control kits.

Mark of Dependability...

IN AIR CONDITIONING • REFRIGERATION • HEATING

Members of the Dunham-Bush family have been serving the air conditioning, refrigeration and heating industries for an amazing total of 167 years.

This more than a century and a half of heat transfer experience is your assurance of *dependable* products.

And you can depend on the man behind the product... the Dunham-Bush sales engineer. He's ever available . . . near your town . . . to assist you. His technical skills aid you in *three* great industries.

May we send him your way to talk about the "CR" line and other great dependable products by Dunham-Bush!

For One Source—One Responsibility, look to...

Dunham-Bush, Inc.

DUNHAM-BUSH

WEST HARTFORD 10 • CONNECTICUT • U. S. A.

MICHIGAN CITY, INDIANA • MARSHALLTOWN, IOWA • RIVERSIDE, CALIFORNIA • UTICA, NEW YORK

SUBSIDIARIES

heat-x HEAT-X, INC. BREWSTER, N.Y.

DUNHAM-BUSH DUNHAM-BUSH (CANADA), LTD. TORONTO, CANADA

BRUNNER THE BRUNNER CO. GAINESVILLE, GA.

DUNHAM-BUSH DUNHAM-BUSH, LTD. LONDON, ENGLAND

Pittsburgh Superfine is applied to air conditioner cabinet. Ease of handling has cut this operation time 50%. Superfine does not disintegrate or flake off.

(Below) Pittsburgh Superfine improved working conditions at Chrysler Airtemp since it does not flake off or injure hands of workers.

Pittsburgh Superfine cuts installation time 50%, helps produce better end products at Chrysler Airtemp

Production requirements at the Airtemp Division of Chrysler Corporation, Dayton, Ohio call for a flexible, well-bonded, efficient glass fiber insulation for air conditioning and heating units to prevent condensation or heat transfer at metal cabinet walls. Pittsburgh Superfine fulfills these requirements.

Glass fiber insulation previously used flaked off, would be ejected by the air stream. Measures improvised to correct this were costly and added production time.

But PPG Superfine, being specially bonded, avoided this disintegration. Superfine prevents condensation on cabinet walls and eliminates excessive temperature rise in heating unit enclosures.

Easier handling, too!

The rigid, brittle glass fibers of the material previously used caused dangerous cuts on workers' hands, despite heavy gloves. The old material was hard to position during assembly.

Now with Pittsburgh Superfine, installation time is cut in half. Superfine is flexible, easy to handle, does not flake off or cause cuts. Working conditions are much improved.

What can Pittsburgh Superfine do for you?

Pittsburgh Superfine offers you top insulating results in heat or cold applications . . . and in sound deadening, too! Find out about all its advantages. Then give it a try. For more information, write *Pittsburgh Plate Glass Company, Fiber Glass Division, One Gateway Center, Pittsburgh 22, Penna.*

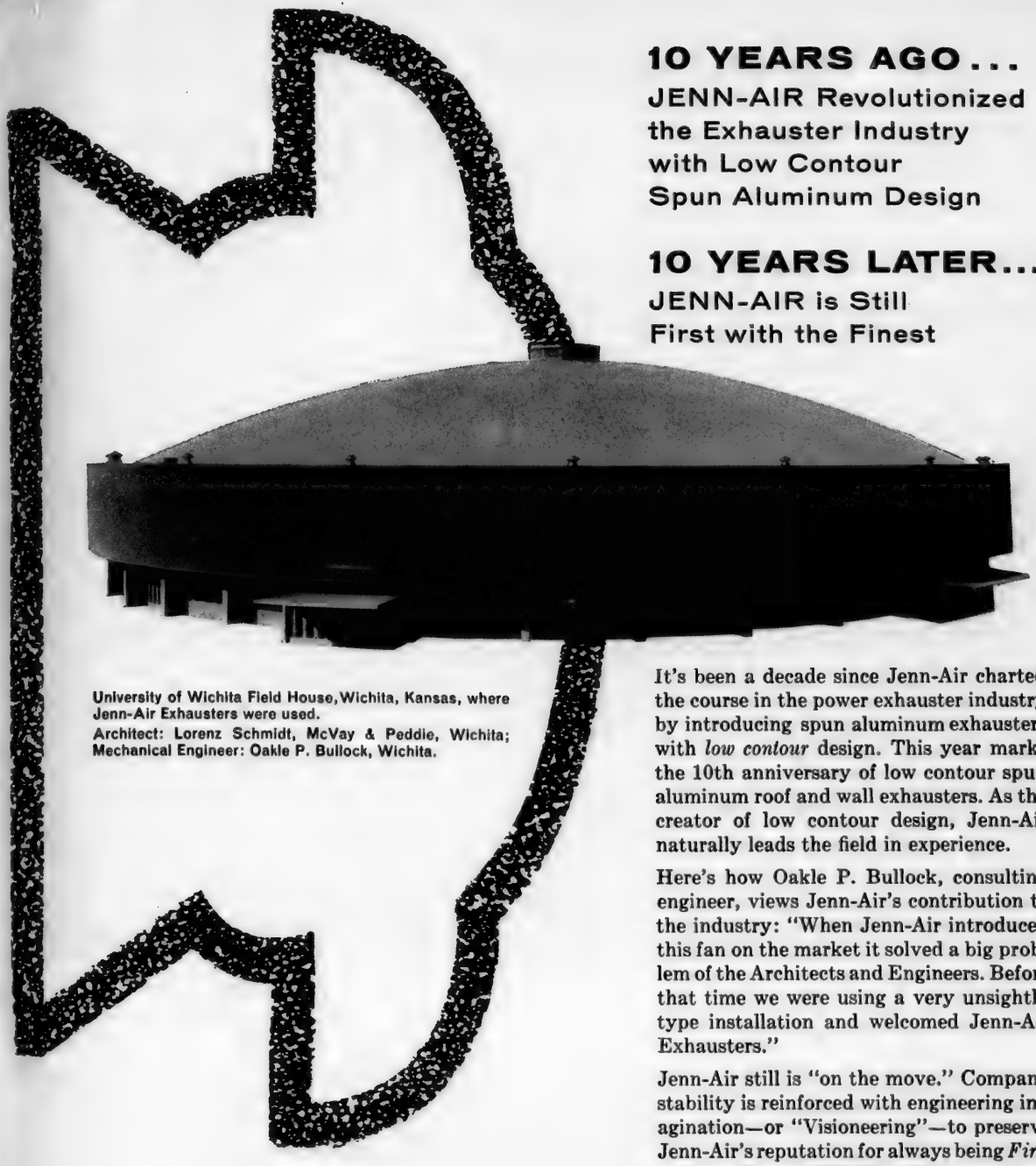
PITTSBURGH SUPERFINE IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia, Pittsburgh and St. Louis

FIBER GLASS PPG

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

PITTSBURGH PLATE GLASS COMPANY



University of Wichita Field House, Wichita, Kansas, where Jenn-Air Exhausters were used.
Architect: Lorenz Schmidt, McVay & Peddle, Wichita; Mechanical Engineer: Oakle P. Bullock, Wichita.

10 YEARS AGO...

JENN-AIR Revolutionized the Exhauster Industry with Low Contour Spun Aluminum Design

10 YEARS LATER...

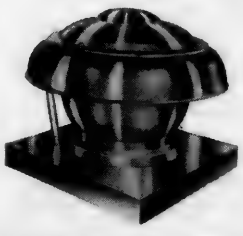
JENN-AIR is Still First with the Finest

It's been a decade since Jenn-Air charted the course in the power exhauster industry by introducing spun aluminum exhausters with *low contour* design. This year marks the 10th anniversary of low contour spun aluminum roof and wall exhausters. As the creator of low contour design, Jenn-Air naturally leads the field in experience.

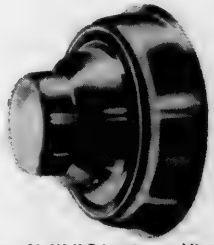
Here's how Oakle P. Bullock, consulting engineer, views Jenn-Air's contribution to the industry: "When Jenn-Air introduced this fan on the market it solved a big problem of the Architects and Engineers. Before that time we were using a very unsightly type installation and welcomed Jenn-Air Exhausters."

Jenn-Air still is "on the move." Company stability is reinforced with engineering imagination—or "Visioneering"—to preserve Jenn-Air's reputation for always being *First with the Finest*. FIRST with low contour design and spun aluminum construction . . . and now, FIRST with stainless steel U-spring vibration isolators which show 44% less vibration transmission than rubber or neoprene.

JENN-AIR PRODUCTS COMPANY, INC.
1102 Stadium Drive • Indianapolis 7, Indiana



Jenn-Air Quiet-Tested Roof Exhauster, with U-Spring Cushion Suspension Mounting. Note low contour design.



Jenn-Air Wall Exhauster—architecturally-sculptured button design, spots ventilation control.

Air Conditioning Control at

CONVAIR–HOME OF THE H

Johnson Pneumatic Control System Solves the Varied Temperature Regulation Problems of One of the World's Largest Air Conditioned Industrial Plants

Convair's impressive record in aircraft production was highlighted recently by the design, development and, now, the production, for the United States Air Force, of the nation's first supersonic bomber, the Convair B-58 "Hustler".

PROBLEMS ARE COMPLEX

Accurate control of thermal conditions for this and other vital work is provided by a Johnson Pneumatic Temperature Control System. The multi-building Convair-Fort Worth plant, one of the world's largest, poses a variety of intricate temperature regulation problems due to its enormous size, diversified usage requirements, the types and number of systems controlled and wide load variations within, as well as among the various buildings.

USE REMOTE RESET

Largest of the buildings is the 4,000-foot-long Assembly Building which is air conditioned by large built-up systems using hot and chilled water. Control in the windowless structure is accomplished by Johnson remote readjustable thermostats in the spaces operating face and bypass dampers, outdoor and return air dampers and water valves on the coils. Six 1,000-ton refrigeration machines are installed for this one building alone.

A key feature of the pneumatic control system is a central control panel which greatly simplifies the control work and provides the flexibility needed to heat, cool and ventilate the buildings efficiently.

PNEUMATIC OFFERS ADVANTAGES

Countless leading buildings, of all types and sizes, are equipped with Johnson Pneumatic Temperature Control Systems. Whether your particular problem involve comfort conditions or protective temperatures and humidities for products and processes, pneumatic control meets every requirement. It's simpler by far than any other method of control —requires fewer components, is easier to operate and maintain, offers the widest choice of operating features.

A nearby Johnson engineer will gladly explain how these advantages can be applied to your problems. Johnson Service Company, Milwaukee 1, Wisconsin. Direct Branch Offices in Principal Cities.

Convair Division, General Dynamics Corporation, Fort Worth, Texas. Besides the huge Main Assembly Building, other buildings with Johnson Pneumatic Control include the Development, Radar, Experimental and Flight Test Buildings and Test Laboratories A and B.

"HUSTLER"

. . . Engineering

. . . Testing

. . . Assembly

JOHNSON CONTROL

PNEUMATIC SYSTEMS

DESIGN • MANUFACTURE • INSTALLATION • SINCE 1885

When It Comes to Humidification . .

Here is some information to consider:

Automatic Armstrong Steam Humidifiers give large humidifying capacity at low cost —by discharging clean, dry steam directly into room atmosphere, or into the air stream in ducts or plenums. Control is by accurate humidistats. Connections are made directly into steam supply and return lines, and to 110 or 220 volt electrical circuits.

Pneumatic controls also are available.

Advantages of Armstrong Steam Humidifiers

1. Uniform, Accurate Control. Armstrong Steam Humidifiers give humidity control throughout the room to within 2 to 4% of humidistat setting.

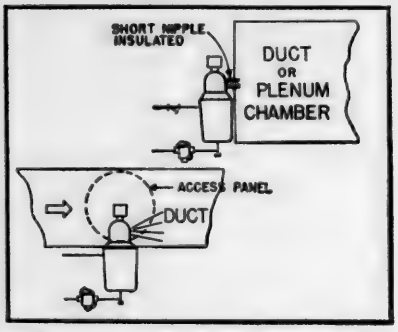
2. No "Fall-out" of Water or Mineral Dust. No water droplets come out of an Armstrong humidifier because the inner chamber is steam-jacketed to evaporate any condensation. And, dry steam leaves no mineral residue to settle out of the air.

3. Easy to Install. Installation of units is similar to that of unit heaters. For simple duct and plenum installations, see Fig. 2.

4. Dependable Quality, Minimum Maintenance. Fan motor bearings are oilless type . . . never need lubrication. Solenoid coils are glass wound. Valves and humidistats are designed for years of service. Simple; sturdy construction means minimum maintenance.

5. Moderate Initial Cost. Mass production and simplicity of design provide a high-quality unit at a moderate price.

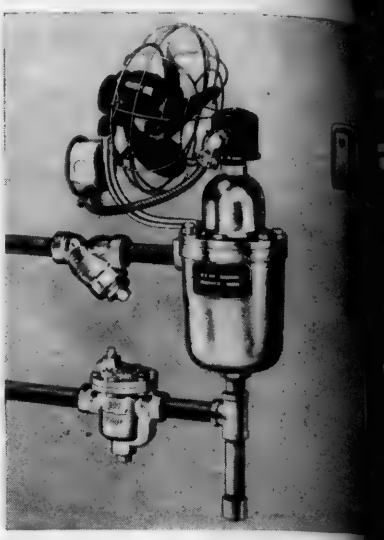
6. Low Operating Cost. The cost of steam for humidification to 50% relative humidity at 70°F. averages no more than 1c per 1000 cubic feet of space for a 24-hour day. And the load on the boiler is no greater than the heating load required to evaporate a water spray. The cost of electricity for the fan is as little as ¼ cent per day where the rate is as high as 3 cents per kilowatt hour.



Duct and plenum chamber installations

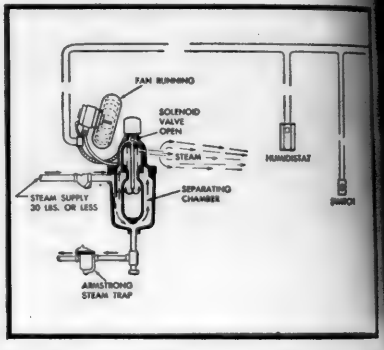
RECOMMENDED HUMIDITIES FOR VARIOUS TYPE ROOMS

Room	*% RH*
Offices, Schools (Health & Comfort)	35-45
Libraries (Protection of Books)	50
Hospital Croup Rooms	90
Static Control	50 or more
Paper Fabricating	40-50
Wood Processing	35-50



HOW THEY WORK

When relative humidity drops slightly below desired level, humidistat activates solenoid valve, which admits steam into separating chamber and thence to room atmosphere. Fan helps disperse steam. When relative humidity reaches desired level, humidistat closes valve and stops fan.



Types Available

ELECTRICALLY OPERATED:

Types C-2 and C-3—These two humidifiers are identical except for size and capacity. The C-2 lists at $170 complete (with fan, humidistat, strainer and steam trap); its capacities for various conditions are listed in the table below. The C-3 (list price $295 complete) has a capacity more than double that of the C-2.

Type VC-2 and VC-3—Similar to C-2 and C-3, but without fans, relying on the velocity of the steam jet for dispersion. At pressures from 5 to 15 lbs. a venturi nozzle is provided. VC-2 lists at $145, VC-3 at $259.50.

Type MC-2—This unit is not automatic, having a manual shut-off valve. List price is $105.25 with venturi, $132.75 with fan.

Type CK-4—A large capacity unit for connection to central heating ducts or large floor-type unit heaters. Automatic humidistat control. Capacity is 6 to 16 times as great as the C-2, depending on pressure. List price is $545.

AIR OPERATED AND CONTROLLED:

Types DA-32, DA-33 and DA-34—just like the C-2, C-3, and CK-4 but with pneumatic humidistats and air-operated valves.

C-2 CAPACITIES

(Maximum cubic feet of space humidified by one Armstrong C-2 Humidifier at 75°F indoor temperature and 0°F, 75% RH outdoors—2 air changes per hour)

Steam Pressure At Humidifier	Humidifier Capacity Lbs./hr.	Relative Humidity To Be Maintained							
		35%	40%	45%	50%	55%	60%	70%	80%
5	42	49,000	43,000	37,000	33,000	30,000	27,000	23,000	20,000
10	60	70,000	61,000	54,000	48,000	43,000	39,000	33,000	29,000
20	65	77,000	66,000	58,000	52,000	47,000	42,000	36,000	31,000
30	76	90,000	77,000	68,000	60,000	54,000	50,000	42,000	36,000

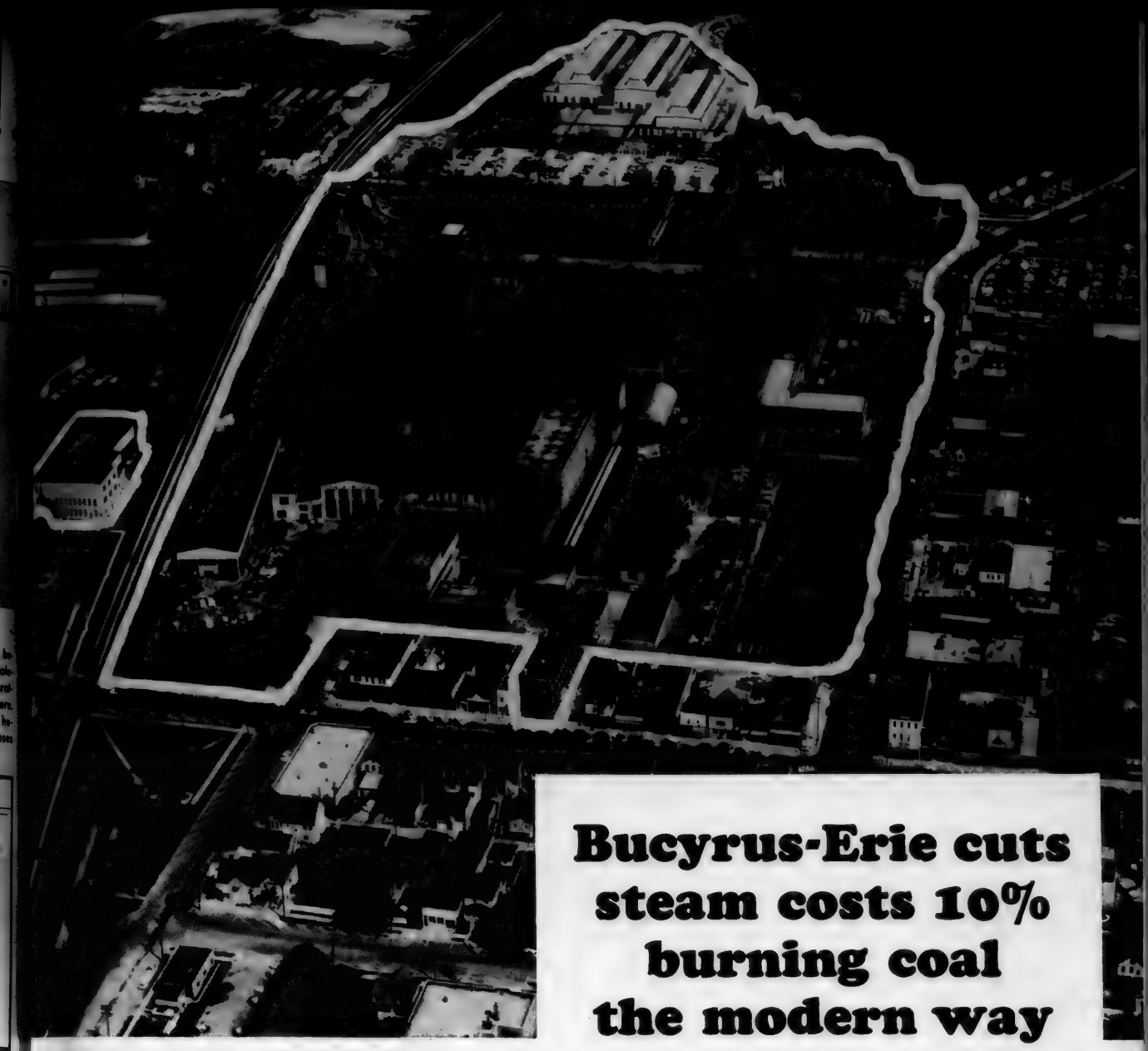
For Details, Prices and Assistance

Your local Armstrong Representative will be glad to give you complete details and prices, and help you survey and plan your humidification job—at no cost or obligation on your part. Or you yourself can make the survey, with the help of information given in Armstrong Bulletin 500.

For Complete Information

SIXTEEN-PAGE BULLETIN NO. 500 contains a wealth of information about humidification. Tells: how relative humidity affects products and your profits . . . other effects of relative humidity . . . recommended humidities for various operations . . . advantages of Armstrong Steam Humidifiers . . . how present users have profited . . . complete data and prices on all Armstrong humidifiers . . . selection and installation data. To get your copy, just call your local Armstrong Representative or write

ARMSTRONG MACHINE WORKS
8466 Maple Street
Three Rivers, Mich.



Bucyrus-Erie cuts steam costs 10% burning coal the modern way

Consult an engineering firm

Designing and building hundreds of heating and power installations a year, qualified engineering firms can bring you the latest knowledge of fuel costs and equipment. If you are planning the construction of new heating or power facilities—or the remodeling of an existing installation—one of these concerns will work closely with your own engineering department to effect substantial savings not only in efficiency but in fuel economy over the years.

facts you should know about coal

In most industrial areas, bituminous coal is the lowest-cost fuel available. • Up-to-date coal burning equipment can give you 10% to 40% more steam per dollar. • Automatic coal and ash handling systems can cut your labor cost to a minimum. Coal is the safest fuel to store and use. • No smoke or dust problems when coal is burned with modern equipment • Between America's vast coal reserves and mechanized coal production methods, you can count on coal being plentiful and its price remaining stable.

Bucyrus-Erie Company, South Milwaukee, Wis., had a steam generation problem. Not only was original equipment deteriorating but capacity proved inadequate for expanding plant facilities. Working with consultants Gates, Weiss and Kramer, of Milwaukee, the company decided to modernize its power system.

Today the power plant at Bucyrus-Erie is almost completely automatic and utilizes the newest coal-burning and handling equipment. In addition to increasing steam generating capacity 85%, this modernization program has lowered annual steam production costs 10% and labor costs 35%. Burning coal the modern way has increased steam quality, improving production processes and heating throughout the plant.

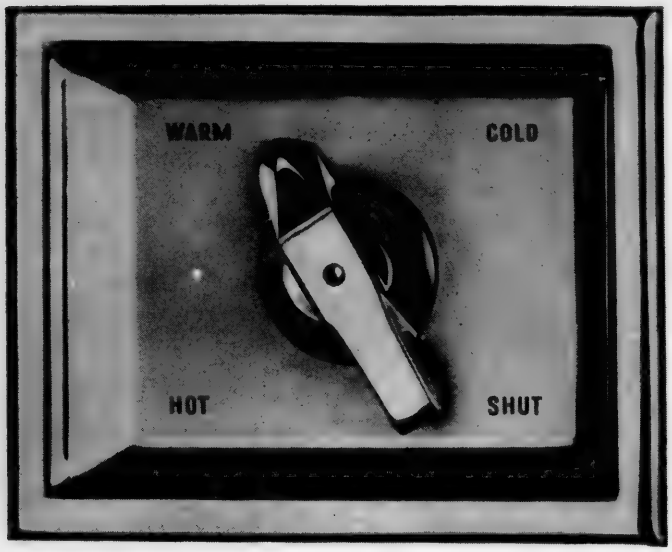
For additional case histories on burning coal the modern way or for technical advisory service, write to the address below.

BITUMINOUS COAL INSTITUTE
Southern Building • Washington 5, D C.

Install fully foolproof...100% safe

ANTI-SCALD SHOWERS

WITH THE *Recesso*



Futuristic styling on the outside...
rugged performance on the inside...

THE *Recesso* IS INDUSTRY'S NEWEST AND MOST ADVANCED SHOWER MIXING VALVE!

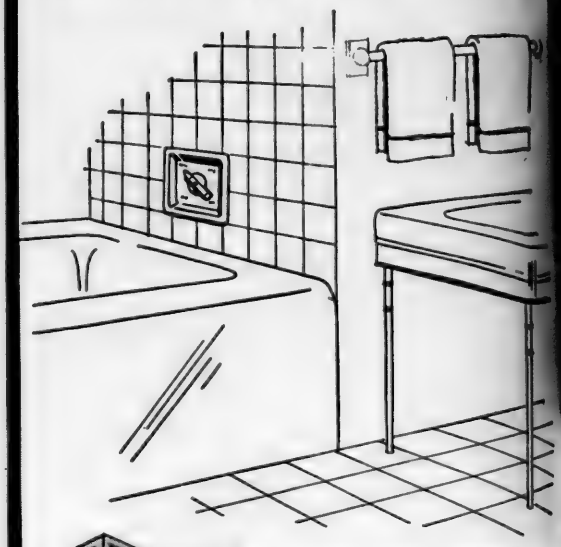
Designed to go hand-in-hand with today's architectural trends, **"The Recesso"** combines built-in building beauty with highly sensitive, accurate thermostatic control.

New inside as well as out, **"The Recesso"** features a new improved thermostatic valve which provides greater sensitivity . . . greater anti-scald protection . . . greater showering comfort.

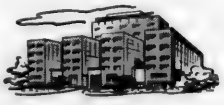
"The Recesso's" futuristic recessed dial plate fits completely in the wall. There's no dangerous protrusions . . . nothing to cut or tear. Injuries from shower falls are reduced to an absolute minimum.

HERE'S 100% ASSURED ANTI-SCALD, MORE COMFORTABLE SHOWERING FOR YOUR CUSTOMER!

INDUSTRY'S FIRST COMPLETELY RECESSED THERMOSTATIC SHOWER MIXING VALVE!



HOTELS – Smarter appearance of Lawler's new "BCA" makes it a must for leading hotels and motels everywhere.



HOSPITALS – Precise engineering gives the accuracy that modern medicinal and therapeutic procedures demand of thermostatic controls.

INSTITUTIONS–Lawler valves, including the "BCA" and "BAM" are being widely used by the country's largest schools and universities for truly safe group showering.

THE *Lawler* Line of

PERFORMANCE TESTED FOR LONGER LIFE

Steam Temperature Regulators
Thermostatic Shower Mixing Valves
Water Controllers
Tempering Valves

DESIGNERS AND PRODUCERS OF THERMOSTATICALLY OPERATED VALVES SINCE 1895

Thermostatic Control Valves

LAWLER AUTOMATIC CONTROLS, INC., MT. VERNON, N. Y.

A REFRIGERATOR, TOO, CAN BE THE STRONG, SILENT TYPE

One home refrigerator with a reputation for silence and long service life depends upon B&W for "the type of tubing necessary to the efficient operation of the refrigerator. Without it, the refrigerator could not provide the required performance. It must last the life of the unit."

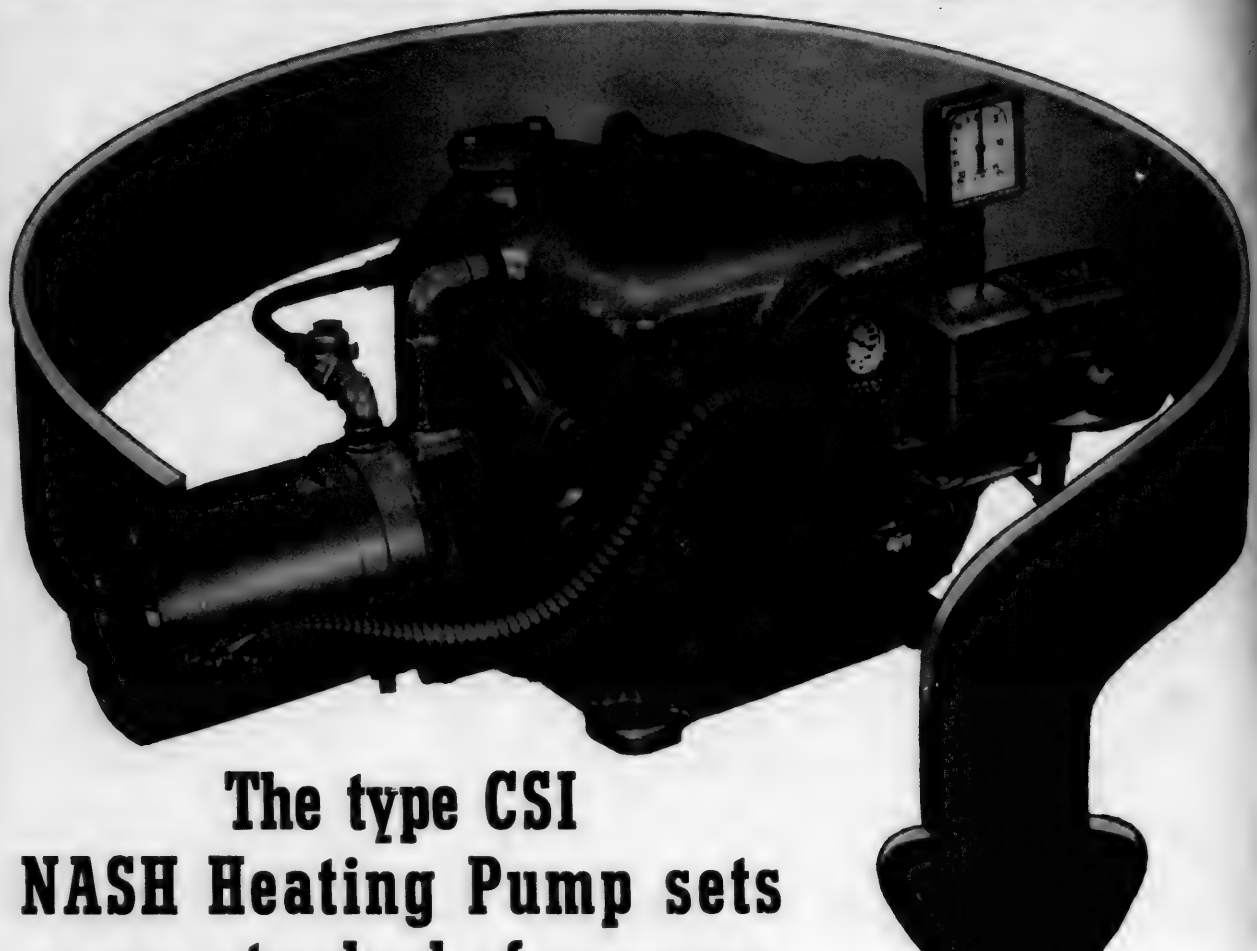
To meet that tough specification for evaporator coils and high temperature coils, B&W supplies Electric-Resistance-Welded Tubing with precision-made serrations on the I.D. Rockwell hardness must be held within close tolerances, and the seam-weld must withstand 1,000 pounds pressure—no interior surface copper is permitted.

For special applications like this, get in touch with Mr. Tubes, whose specialty is matching tubes to jobs to save you time and money. For many Electric-Resistance-Welded tubing requirements, you'll find that your nearby B&W distributor maintains comprehensive stocks to meet your needs. The Babcock & Wilcox Company, Tubular Products Division, Beaver Falls, Pa.

Seamless and welded tubular products, seamless welding fittings and forged steel flanges in carbon, alloy and stainless steels

TA-6074-GP

It's a NASH Heating Pump, PLUS!



The type CSI NASH Heating Pump sets a new standard of economy

Now a Nash quality Vacuum Heating Pump can be economically installed and operated on any steam heating job. Engineered for high performance and low installed first cost, this new pump still makes use of time tested Nash principles of operation.

The Nash CSI has generous air capacity and features a wide choice of water capacities and discharge pressures. The right combination of capacities is at hand to match the requirements of the job. It is no longer necessary to pay extra for a pump with excessive water capacity, excessive discharge pressure, or in an attempt to get adequate air capacity.

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1 ECONOMY IN FIRST COST

2 ECONOMY OF INSTALLATION

3 ECONOMY OF OPERATION

4 ECONOMY OF MAINTENANCE

NASH ENGINEERING COMPANY
449 WILSON, SO. NORWALK, CONN.

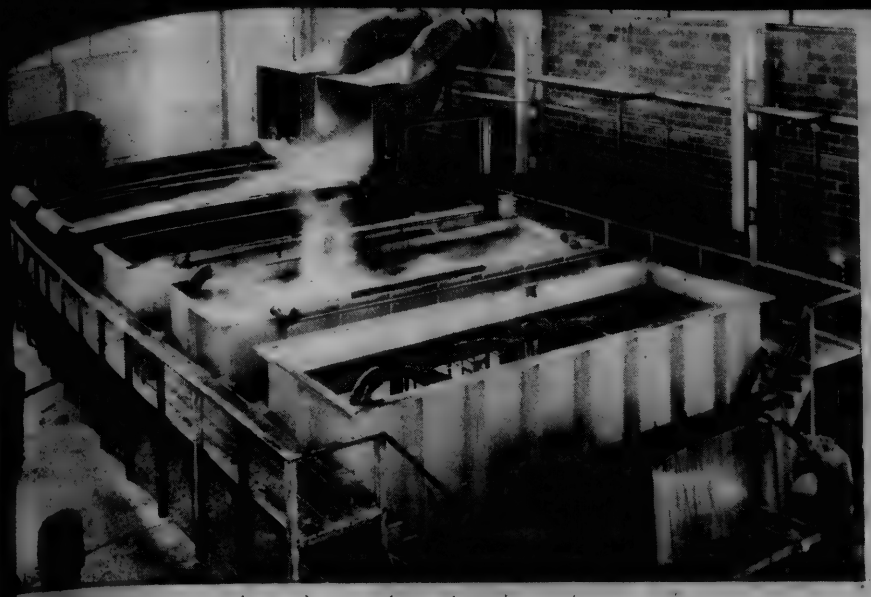


Fig. 1. Pickling tanks are generally installed parallel to a series of tanks used for rinsing after the parts are removed from acid bath.

Supply and Exhaust Ventilation for Metal Pickling Operations

GEORGE M. HAMA
Chief Engineer, Bureau of Industrial Hygiene,
Detroit Department of Health

Metal pickling processes for the removal of scale and rust, result in the liberation of acid fumes and steam that are irritating to workers and cause damage to equipment. Although several ventilating methods may be used to improve operating conditions, many advantages may be obtained through the use of a supply and exhaust (push-pull) system of ventilation. Design data are presented.

SUPPLY and exhaust, or "push-pull" ventilation is especially applicable to hot acid pickling operations. These steel pickling processes consist of placing steel stock for the removal of scales and rust into large tanks containing H_2SO_4. The tanks are often of large dimensions and tanks up to 15 ft wide and 30 ft long have been observed. Liquid in the tank is heated by steam coils or submerged combustion units up to temperatures of 190 deg F.

The pickling tanks are generally placed parallel, along the longest dimension, to a series of rinse tanks closely spaced together, as shown in Fig. 1.

Need for Ventilation

It is desirable to ventilate these tanks for the following reasons:

1. The pickling process results in entrainment of sulfuric acid droplets into the workroom air. This mist is highly irritating to the eyes, nose and throat and at times may be unbearable to the workers.
2. The acid mist and steam cause rusting of metal, rotting of wood, and corrosion which results in increased depreciation and maintenance costs.
3. The large quantities of steam and fog reduce the visibility to the extent that safety may be jeopardized.
4. Neighborhood nuisances may be created from unventilated tanks. This condition can be to some extent alleviated by ventilating the tanks and discharging the contaminated air through a high stack or a scrubber.

Methods of Ventilation

These tanks may be ventilated by general ventilation, local slot exhaust ventilation, and supply and exhaust (push-pull) ventilation.

Overhead canopy hoods, enclosing hoods, and tunnel hoods cannot be applied to this process, as free access is needed both from the top and sides for the overhead crane loading of steel stock. See Fig. 1.

General ventilating is probably the most widely used method. It is, however, unsatisfactory in most cases because of the poor efficiency of control. Also, the large air volumes necessary cause increased heating costs and excessive cooling of the workroom in winter time.

Slot exhaust ventilation of the type used on plating tanks has not been used extensively on large acid pickling tanks. Heated tanks of this size require slots along the two sides of the tank with air flows of at least 200 to 350 cfm per square foot of tank area to give a fair degree of control. Slots the long way of the tank often cannot be used as the tanks are placed too close together for an adequate plenum space to give good distribution. Because of the large tank dimensions in width as well as length, the capture of steam and mist in the center of the

George M. Hama received a B. S. in Chemical Engineering and later a M. S. in Chemical Engineering from the University of Minnesota. He was awarded a M. S. in Sanitary Engineering from Harvard University. From 1937 to 1940 he served as ventilation engineer, St. Joseph Lead Co., and from then to the present, chief engineer, Bureau of Industrial Hygiene, Detroit Health Department. He is a non-resident lecturer, University of Michigan, Ann Arbor, Mich.; member of the teaching staff, Industrial Ventilation Conference, Michigan State University, Lansing, Mich.; co-author of the book Industrial Ventilation of the American Conference of Governmental Industrial Hygienists. He is chairman of the Industrial Ventilation Committee of that conference.

tank is not always accomplished. For these reasons, lateral slot ventilation is often ineffective, poorly designed, and not infrequently consists of a wall fan of the propeller type connected by a short duct to a hood at the narrow end of the tank. This arrangement provides ventilation for only a quarter to a half of the tank. The visible mist and fog from the tank provides a good visual means of observing the effectiveness of the ventilation hoods.

Push-pull System

Supply and exhaust (push-pull) systems are the outcome of an attempt to improve the one slot exhaust system of the type just mentioned. In an attempt to direct the mist and steam from the unventilated portion of the tank beyond the effective zone of the exhaust slot, a stream of air is blown from the edge of the tank opposite the exhaust hood towards the hood. This type system has not been extensively used for large tanks largely because of the lack of suitable and easily applied design data. If properly designed, this method has the following advantages over aforementioned methods:

1. Efficiency of control is good.
2. Smaller volumes of exhausted air can be used, reducing capital costs on fan equipment and conserving heat.
3. The slot can be installed on one narrow side of the tank and it requires only one duct which is generally placed on the outside wall. This does not interfere with the loading of stock or the movement of the overhead crane.

Supply and exhaust systems have the disadvantage that during the putting in and removal of parts to be pickled, there is some interference with the air flow pattern from the supply slot, this causes a momentary dispersion of mist and steam into the air. This is not serious, however, in steel pickling as the interference occurs only for a few seconds; the period the steel is in the tank may vary from 15 to 30 minutes.

Operation of a Push-pull System

A diagrammatic sketch of a push-pull system is shown in Fig. 2. Air is blown across the face of the liquid from the pressure slot hood at the left side of the diagram, into the lateral exhaust hood on the far end of the tank. The supply air, in being blown across the tank towards the exhaust hood, mixes with the surrounding air and entrains it so that with increasing distance from the slot, the air volume constantly increases. The volume of exhausted air at the receiving hood must obviously be greater than the final combined volume of supply air and entrained air that reaches it. The supply and entrained air jet stream diverges with increasing distance from the slot so that at the exhaust the height of the supply stream is sizable. To be effective, the exhaust hood must be high enough to accommodate it. The angle of the supply and entrained air jet stream is approximately 10 to 12 deg.

There have been various recommended ratios of supply to exhaust air. In general, however, the push-pull systems investigated have been mainly on relatively small tanks. Several large systems that have been observed have failed to work properly because too large a volume of supply air has been used. This overloads the exhaust hood causing spillage out of the hood, or requires unnecessarily high or large volumes of exhaust air to take care of the supply air. Obviously, the ideal condition is to provide just enough supply or positive pressure air to direct the mist and vapor from the far end of the tank into the zone where a minimum quantity of exhaust air from the exhaust hood sets up a definite movement of air towards the exhaust hood, thus effecting complete capture.

Since there is little theoretical data on push-pull systems for large tanks of this type, data for this paper were obtained empirically by trial and error methods. A rough indication of the increase in air volume due to entrainment was obtained from work done on air entrainment ratios on supply air slots used for room ventilation. It appears from this work that entrainment ratios increase with distance and for large tanks were probably quite high and of the magnitude of 1:20 and greater.

Use of a Pressure Supply Slot

As previously stated, attempts to exhaust the large tanks with a single exhaust slot on the narrow end and with air flows of 200 to 350 cfm per square foot of the tank area, indicated from visible mist and fog that only a half or less of the tank was ventilated, and escape of mist and vapor took place at the far end of the tank. It appeared, however, that if air were blown across these tanks from the far end by means of a supply slot, that control could be improved.

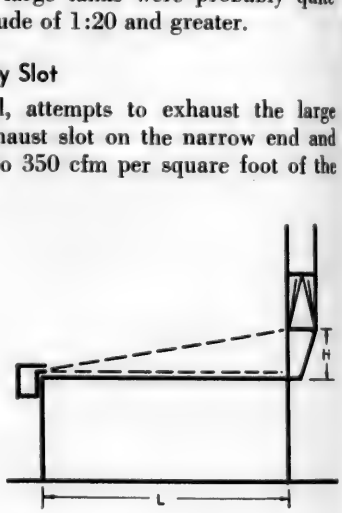


Fig. 2. Sketch of a push-pull ventilating system.

A pressure supply slot was therefore installed on the far end of a tank directing the air toward an existing exhaust hood, exhausting about 200 cfm per square foot. The slot was equipped with a centrifugal fan and a damper for regulating the air flow, a slot area was arbitrarily selected to give a velocity of 1500 to 2500 fpm. Various air flows were tried in the pressure slot to determine the minimum quantity of supply air which effected good control as noted by observing the mist and fog. The

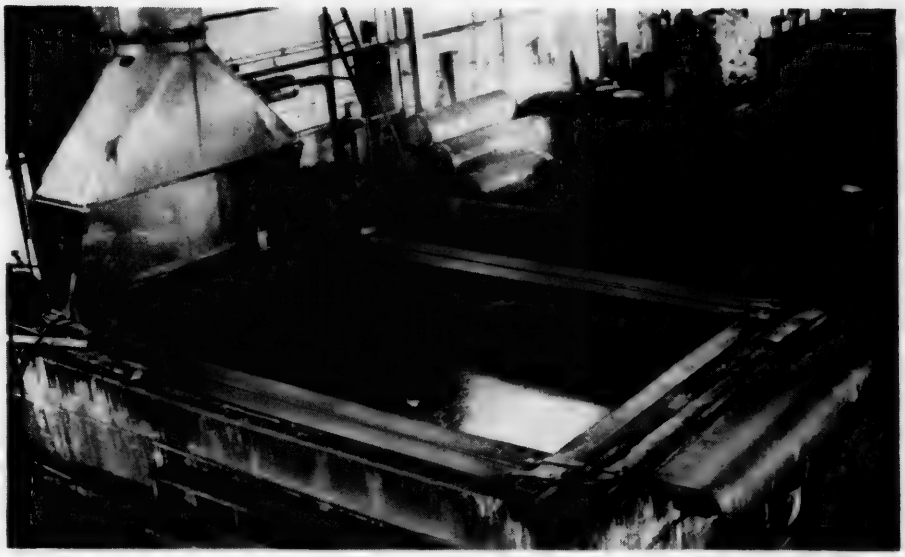


Fig. 3. Figures for air exhaust are given in article for tank illustrated.

pressure slot air flow was dampered down to the point where good control was just barely attained, and the damper was fixed. This setting of the damper resulted in a lateral velocity of about 150 to 200 fpm, two-thirds of the tank distance from the supply slot on a 17 ft tank. With the air flow through the supply slot set at this position, the exhaust air flow was then reduced from about 200 cfm per square foot of tank area to a point where good control was just attained. Insufficient exhaust air manifested poor control by an escape of mist, visible fog and vapor from the outer edges of the exhaust hood. This appears to indicate the volume of air exhausted was less than the supply air together with entrained air coming into it. Results of this trial and error test of the tank in Fig. 3 are as follows:

Tank size 17 ft x 8.5 ft. Required supply air (pressure slot) is 840 cfm (5.8 cfm per sq ft). Exhaust hood height is 3.5 ft.

Total Exhaust Air, CFM	CFM per Sq Ft Tank Area	Remarks
27,000	190	Damper open, complete capture
19,000	130	Complete capture
18,000	125	Just complete capture
16,000	110	Occasional escape at one corner of hood
13,500	95	Escape at side of hood

Attention is directed to the fact that "just complete capture" takes place with a total air exhaust of 18,000 cfm.

A similar installation on a 27 ft x 7 ft tank, illustrated in Fig. 1, with an exhaust hood height of 6 ft and slot velocity of 2000 cfm, required the following air flows:

Exhaust	150 cfm per sq ft	28,000 cfm total exhaust
Supply	6.3 cfm per sq ft	1200 cfm total exhaust

The entrained air pattern from the supply slot has been observed to diverge or fan out so that the height of the air stream is sizable at the point where it reaches the exhaust hood. See Fig. 2. The exhaust hood must be, therefore, high enough so that the stream of air from the pressure slot does not blow over the hood. The angle of divergence (the included angle between the upper edge of the supply slot air stream pattern and the horizontal surface of the tank) has been observed to be 10 to 12 deg. The maximum height of the stream at the exhaust hood end of the tank can be calculated, when the angle is known and the length of the tank is known. If an angle of 11 deg is assumed, the maximum height of the stream is Length x Tangent 11 deg. Since the tangent for an 11 deg angle is 0.2, the minimum necessary height of the exhaust hood is equal to the length of the tank x 0.2.

Although not used on these installations, side wing baffles when they are placed on the exhaust hood may improve control.

Design Data

On the basis of experimental data obtained from several large hot sulfuric acid pickling tanks, the following design data is suggested for tanks in the size range of 15 to 30 ft long with the hoods in the narrow ends of the tank:

Pressure, or Push Slot. Provide a slide damper for adjusting air flow.

Design for maximum air flow volume of 7 cfm per sq ft of tank area.

Design for a slot velocity of 2000 fpm. Use sufficient plenum for uniform distribution.

Exhaust Hood. Minimum hood height = 0.2 x tank length (side wing baffles may be used).

Exhaust air flow volume 125 to 150 cfm per sq ft of tank area, depending on liquid turbulence, cross drafts and safety factor in control is desired.

When installation is complete, the supply or "push" air flow should be regulated by the slide damper. Supply air flow should be dampered down to a point where control is just attained. When the proper quantity is arrived at, the damper should be permanently fixed.

An effective method of local exhaust ventilation has been described for large acid pickling tanks that are rather difficult to ventilate. The method consists of a supply or "push" slot and exhaust or "pull" hood. Air flow specification and hood sizes are given for a select size of large tanks from 15 to 30 ft long.

What Kind of Job for 4%?

R. G. VANDERWEIL

Consulting Engineer, Boston, Mass.

The consulting engineer concentrating his activities on the design of school heating systems finds himself in an advantageous position when he maintains a continued flow of production of smoothly functioning systems. With repetitious design, not only will he increase his rate of production, but reduce the number of design errors, and hence, of extras. Owners are very much aware of a 2% extra, should it occur, in a final bill. They are equally unaware of a 12% saving in the bid price, should it exist, which can be the result of careful planning. The author makes a plea for a revision of the fee structure to enable the consulting engineer to give that degree of study and consideration that will result in better heating systems.

THE problem of school economy calls for continuing research and study. However, if an engineer attempts to give the kind of consideration to the design of a primary school building that he can give to a 40-story office building, his economic position is in jeopardy.

Fig. 1 shows the rather insignificant part of the taxpayers' dollar investment that is allocated to school design. Such a small slice of the pie, it may be thought, makes selection of an engineer by the architect unimportant. Perhaps this selection should be based on free competition or even personal acquaintanceship. But when it is realized that good engineering effort may be reflected in savings many times the amount of the engineer's fee, it appears that a more important criterion would be the engineer's willingness to search for new methods and to analyze his past records on similar projects.

Study and Development Neglected

Just what does an engineer's work consist of? There are (a) drafting (greatly reduced with fully repetitious design), (b) actual design and study of specifications (if he fits the heating system to the building), and (c) supervision of construction. These are considered nowadays to be the chief functions. Unfortunately, other very important engineering responsibilities have become lost. To the three above should be added (d) study of system economy and (e) development of "the better system."

Fees normally available for fair-sized projects of the institutional or commercial type, as apportioned to the various phases of work, are listed in Table 1, columns (a), (b), and (c). Items (d) and (e) are never contracted for. Note that the engineer's percentage fee is paid on the cost of mechanical work only. If a building costs $1,000,000 and the mechanical work amounts to $280,000, the architect's fee being 7% and the engineer's fee 5%, the engineer's compensation will be 0.05 times 280,000, or $14,000.

In order to show how item (d), Table 1, cost analysis, can alter the cost of construction and maintenance, suppose that a generous engineer and a still more generous architect agree that the engineer will supply an economy study in return for an increase in mechanical design fee of 1%. Should the mechanical engineer, by careful planning, be able to reduce the cost of mechanical work by 17%, the effect on the school dollar and the architectural and engineering fees, as compared to an average and poor situation, is most enlightening. See Table 2.

In the case of average design (Item 1, Table 2) the engineer has used his scant 4% to apply sound experience gained from numerous prior projects. Item 2 illustrates poor design, where the engineer, again applying his design experience, misjudges. Bids come in high and plans are redesigned. The case of good design is based on the assumption that efficiency studies and esti-

TABLE 1—FEE STRUCTURE IN FAIR-SIZED PROJECTS

Functions	Fee apportioned	Fee sub-totals
Regular fee		
(a) drafting	2%	2%
(b) design and specs.*	1 to 2%	3 to 4%
(c) supervision**	1%	4 to 5%
Extra-curricula activity		
(d) cost analysis***	1%	5 to 6%
(e) system development	1%	6 to 7%

* Quite common where projects are either sizeable or repetitious.
** Often not paid for, resulting in insufficient supervision.
*** These amounts may vary greatly, depending on the effort expended, but seem never to be included.

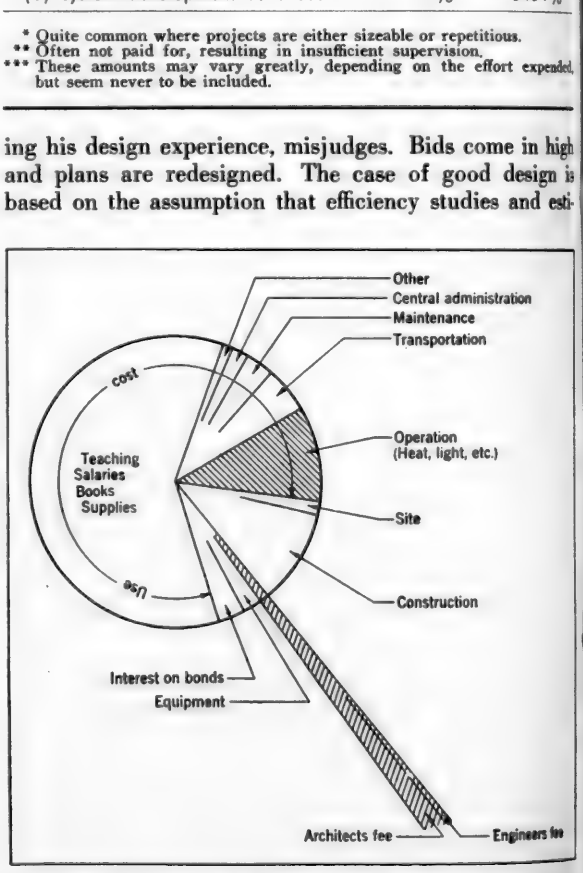


Fig. 1. Design is a small part of school cost.

mates resulted in a more economical heating system.

In the first case the taxpayer gets a building of average economy. Less quality is likely in the second case, as redesign entails considerable delay, while prices spiral. Case 3 shows a reduction in building cost. Note that *an extra 1% expended in design in this hypothetical case is repaid the owner a hundred fold.* An increase of $300 in engineering fee results in a $3500 reduction of architectural fee and a total saving to the owner of $50,000!

A Labor of Love

Why don't we see more of this type of planning? Is it only because of the 1% additional fee? The architect takes a beating in the case of "good" design. Design cost, which amounted to 53% of his fee in the first case, is now 56%. But the additional 3% expended has minimized his chances for double design, which, as in Case 2, causes an essential increase in design cost.

The engineer also takes a beating. He has spent considerable effort in cutting actual construction cost, and thereby his own fee. The additional amount due him by virtue of greater effort is not forthcoming. An additional $300 cannot pay for an extensive study. However, he has lived up to his professional training, created a better building, and improved his reputation!

Engineers Come First

While other engineering groups make great strides, the present fee structure hampers progress in our field. Good engineering demands the engineer come first, and such items as help by manufacturers, as well as draftsmanship, come after. As our profession cannot perform its basic functions, (d) and (e) of Table 1, it cannot attract and put to work as independent thinkers some of the top college graduates. Less-skilled men are hired, then quit when they have acquired the qualifications for a more promising position.

Anyone familiar with contemporary engineering practices in general knows that completed development and engineering costs of a moderately complicated system

R. G. Vanderweil is a graduate of the University of Vienna (M. S. Mech. Eng'g., Technische Hochschule). He spent several years prior to World War II in the power plant and construction fields in Europe, and in the power, heating, and air conditioning fields in the United States. During the war years he was active in research on heat transfer and flow of fluids, and consequently headed the Development Department of the Chase Brass & Copper Co. In 1947 he established himself in Boston where he heads his own firm of consulting engineers.

amounts to about 10 or 15% of the product cost, no matter what the field. Although school design is bound to be partly repetitious, the fees in Table 1 do not permit the hiring of men of that caliber, training, and vision which is possible with cost-plus or government research contracts characteristic of other fields.

Under present AIA rules, we will never be able to compete for top engineering talent. A slight improvement, though, will enable us to do occasional research work essential to the advancement of our profession, and enable us to offer at least a few positions of interest.

Connecticut Leads the Way

A schedule, such as shown in Table 3, and similar to that agreed upon by architects and engineers in Connecticut, would be helpful. Included is the "blue book" fee of the architect, the ratio of architects' to engineers' fees, and the proposed engineering fee. A ratio of 0.75 in the third column means that 75% of that fraction of the architect's fee which he receives for mechanical work is to be paid to the engineer, the remainder to be retained by the architect for coordination.

Even with this schedule the 6% for mechanical work, amounting to $250,000 on a $1,000,000 building, contrasts with an 8.3% architectural fee on a $250,000 building. On the other hand, some research funds will be available on larger projects.

TABLE 2—HOW THE USUAL ENGINEERING FEE STRUCTURE TENDS TO INCREASE CONSTRUCTION COSTS

Bids	Contract price	Arch. and mech. fees		Architect's bills for engineering design and working drawings only			
		Per cent	Amount	Struct. design	Arch. design*	Total** design	Per cent of arch. fee
(1) average design							
Gen. contr. low bid	$1,000,000	7%	$70,000				
3 mech. low bids	280,000	4%	11,200	$9,000	$16,800	$37,000	53%
(2) poor design							
Gen. contr. low bid	1,500,000						
3 mech. low bids	360,000				18,000		
REDESIGN							
Gen. contr. low bid	1,000,000	7%	70,000				
3 mech. low bids	300,000	4%	12,000	9,000	8,000	47,000	67%
(3) good design							
Gen. contr. low bid	950,000	7%	66,500				
3 mech. low bids	230,000	5%	11,500	9,000	16,400	36,900	56%

* This figure is based on the assumption that one-third of the remaining architect's fee is required for design.
** Structural, mechanical, and architectural.

Architects Have Problems, Too

We should not conclude this discussion without noting some important points that put the subject in proper perspective:

The architect himself is up against powerful economic forces that tend to reduce his fee and business volume. Large real estate interests have often joined contractors to become "package dealers." Every major chemical or power, and many other industrial, concerns hire and maintain their own architectural and engineering staffs, who not only perform chemical, power, or other industrial engineering tasks, but also handle their companies' new construction. In doing so they compete with the practicing architect and engineer in most challenging and interesting mechanical fields, as in thermodynamics and heat transfer.

Too many non-professional engineers, such as manufacturers' sales representatives or employees of air conditioning contractors do design work on the side and are in a splendid competitive position, as they work without overhead.

TABLE 3—PROPOSED FEES FOR SCHOOLS

Total building cost	Arch. fee, percent*	Fee ratio, eng./arch.	Eng. fee, percent**
$ 100,000 and over	8.5	.85	7.2
250,000 and over	8.3	.80	6.6
500,000 and over	8.1	.80	6.4
1,000,000 and over	7.5	.75	6.0
2,500,000 and over	6.5	.75	5.0
5,000,000 and over	5.5	.75***	4.0

* From Blue Book, 1951, Mass. Chapter of AIA, complete services.
** Fee includes complete preliminary studies, computations, design, and supervision.
*** Can be reduced to .7 or less where much repetition occurs.

Tighter Control Needed

All of this indicates the need for architects and engineers to set up rules and work toward legislation to protect their professions. The medical profession has done this. Neither nurse nor pharmaceutical manufacturer practices medicine. Like the doctors, we must start to reduce and ultimately eliminate from our fields the competition of non-professional economic entities. It is time that we realized that building service engineering is a professional field, not a production field, and cannot subsist on sub-normal fees.

Gasification of Pulverized Coal in Suspension Studied

Long-range planning by the utility gas industry must consider alternate sources of high-Btu gas, even though large reserves of natural gas are assured. Such planning recognizes that it is not total reserves, but the availability and cost of natural gas at the point of consumption, that is the criterion by which the need for natural gas substitutes should be judged.

Natural gas substitutes, primarily for peak load purposes, have been produced by gasification of oil and other liquid hydrocarbons. However, they must ultimately be derived from coal, the most plentiful and widely distributed of the fossil fuels.

None of the present gasification processes can convert the entire coal substance into 800-900 Btu gas. The conversion of coal to natural gas substitutes therefore involves at least two process steps, one for coal gasification to produce a synthesis gas consisting essentially of carbon monoxide and hydrogen, the other for upgrading the gas by methanation.

First Step Completed

The Institute of Gas Technology, affiliated with Illinois Institute of Technology, Chicago, has completed development of the first step, with a process which is nondependent on the quality or ash content of the coal. This permits utilization of low-grade, low-cost coals.

In the IGT process, which has been tested on a pilot plant scale and is now being used in production of synthesis gas for methanation studies, coarse coal granules are introduced into a carrier stream of compressed air and steam to form a suspension, the pores of the granules becoming infiltrated by the gas. The coal-air-steam suspension is directed through a nozzle, resulting in a rate of pressure drop sufficient to cause a portion of the gas-impregnated granules to be ruptured by internal pressure. The nozzle discharges into a cyclonizer, where the suspension of shattered coal and gas flows in a rapid vertical motion and the particles are further ground by attrition.

The coal-air-steam suspension and additional superheated steam are introduced separately into a high-temperature vortex chamber or second cyclonizer, in which attendant heating, softening, partial devolatilization, and partial combustion further reduce the coal particles, 65 to 85% of which could now pass through a 200-mesh sieve. Compressed oxygen is added, and the stream is passed into a reaction chamber, where the carbonaceous material is gasified in suspension at a pressure above atmospheric. The ash flows as molten slag into a catchpot.

Ready for Methanation

In pilot plant tests at pressures of 5 to 7.5 atm, 90 to 95% of the carbon in both coking and noncoking coals was gasified. The product gases ranged from 70 to 80% hydrogen plus carbon monoxide, with an H_2/CO ratio generally greater than 1.0. Water-gas shift of a portion of this synthesis gas increases its H_2/CO ratio to the 2.0-3.0 range, which is the best for methanation.

Results of the study, which was sponsored by the American Gas Association, are published in IGT Research Bulletin No. 7, *Gasification of Pulverized Coal in Suspension*, by C. G. von Fredersdorff, E. J. Pyrcioch, and E. S. Pettyjohn.

CANADIAN WINTER DESIGN TEMPERATURES

The accompanying winter design temperatures for heating are those values in degrees F at or below which 1%, 2½%, 5% or 10% of the January hourly outside temperatures occur. Letters *A* or *C* following the city name indicate an airport or city weather station, respectively.

These data are by Morley K. Thomas, Deputy Chief, Climatological Service, Meteorological Service of Canada, and Donald W. Boyd, Climatologist, Division of Building Research, National Research Council of Canada, and are reprinted here by permission.

City	Winter Design Temp., Deg. F.			
	1%	2½%	5%	10%
ALBERTA				
Banff	—	−29	—	—
Colgary-A	−35	−29	−25	−16
Camrose	—	−33	—	—
Cardson	—	−30	—	—
Edmonton-A	−39	−33	−29	−21
Grande-Prairie-A	−43	−39	−34	−27
Hanna	—	−34	—	—
Jasper	—	−31	—	—
Lethbridge-A	−38	−32	−28	−19
Lloydminster	—	−37	—	—
McMurray-A	−48	−42	−37	−30
Medicine Hat-A	−41	−35	−31	−22
Red Deer	—	−33	—	—
Taber	—	−33	—	—
Wetaskiwin	—	−33	—	—
BRITISH COLUMBIA				
Chilliwack	—	8	—	—
Courtenay	—	10	—	—
Dawson Creek	—	−38	—	—
Estevan Point-C	14	17	21	27
Fort Nelson-A	−42	−38	−33	−28
Hope	—	2	—	—
Kamloops	—	−21	—	—
Kimberley	—	−25	—	—
Lytton	—	−6	—	—
Nanaimo	—	13	—	—
Nelson	—	−8	—	—
Penticton-A	−14	−6	−1	4
Port Alberni	—	12	—	—
Prince George-A	−43	−32	−25	−16
Prince Rupert-C	5	8	12	18
Princeton	—	−14	—	—
Revelstoke	—	−22	—	—
Trail	—	−8	—	—
Vancouver-A	8	11	15	21
Vernon	—	−13	—	—
Victoria-C	12	15	19	25
Westview	—	10	—	—
MANITOBA				
Brandon-C	−36	−32	−28	−24
Churchill-A	−43	−42	−40	−37
Dauphin	—	−32	—	—

City	Winter Design Temp., Deg. F.			
	1%	2½%	5%	10%
MANITOBA (Cld.)				
Flin Flon	—	−42	—	—
Neepawa	—	−32	—	—
The Pas-A	−43	−39	−30	−26
Portage la Prairie	—	−30	—	—
Swan River	—	−36	—	—
Winnipeg-A	−33	−29	−25	−21
NEW BRUNSWICK				
Bathhurst	—	−9	—	—
Campbellton-C	−14	−11	−8	−3
Chatham	—	−9	—	—
Edmunston	—	−14	—	—
Fredericton-C	−9	−6	−3	2
Moncton-A	—	−8	—	—
Saint John-C	—	−3	—	—
Woodstock	—	−12	—	—
NEWFOUNDLAND				
Corner Brook-C	−4	−1	2	6
Gander-A	−6	−3	0	4
Goose Bay-A	−29	−26	−24	−20
Grand Falls	—	−4	—	—
St. John's-A	−1	1	4	7
NORTHWEST TERRITORIES				
Aklavik-C	−50	−46	−43	−39
Fort Norman-C	−46	−42	−39	−35
Frobisher-A	−51	−47	−43	−39
Resolute-C	−45	−42	−40	−36
Yellowknife-A	−49	−47	−45	−41
NOVA SCOTIA				
Bridgewater	—	2	—	—
Dartmouth	—	2	—	—
Halifax-C	0	4	7	11
Halifax-A	−3	2	5	9
Kentville	—	0	—	—
New Glasgow	—	−1	—	—
Springhill	—	−3	—	—
Sydney-A	−7	1	4	8
Truro	—	−1	—	—
Yarmouth-A	4	7	10	13

City	Winter Design Temp., Deg. F.			
	1%	2½%	5%	10%
ONTARIO				
Bancroft	—	−17	—	—
Barrie	—	−5	—	—
Belleville	—	−11	—	—
Brampton	—	−4	—	—
Brantford	—	−2	—	—
Brockville	—	−15	—	—
Chatham	—	2	—	—
Cobourg	—	−8	—	—
Collingwood	—	0	—	—
Cornwall	—	−15	—	—
Ear Falls	—	−34	—	—
Fort Francis	—	−29	—	—
Fort William-A	−30	−24	−20	−15
Galt	—	−3	—	—
Geraldton	—	−33	—	—
Goderich	—	1	—	—
Guelph	—	−3	—	—
Haileyburg	—	−22	—	—
Hamilton-C	−4	0	5	10
Hanover	—	−5	—	—
Huntsville	—	−16	—	—
Kapuskasing-A	−34	−30	−27	−22
Kenora	—	−32	—	—
Kingston-C	−15	−11	−6	−1
Kirkland Lake	—	−25	—	—
Kitchener-C	−8	−3	2	7
Lindsay	—	−12	—	—
London-A	−5	−1	3	8
Moosonee	—	−36	—	—
Newmarket	—	−5	—	—
Niagara Falls	—	1	—	—
North Bay-A	−24	−20	−16	−11
Orillia	—	−8	—	—
Oshawa	—	−2	—	—
Ottawa-A	−18	−15	−11	−7
Owen Sound	—	0	—	—
Parry Sound	—	−13	—	—
Pembroke	—	−18	—	—
Peterborough-C	−15	−11	−6	−1
Port Arthur	—	−24	—	—
Port Calborne	—	1	—	—
Renfrew	—	−17	—	—
St. Catherines	—	2	—	—
St. Thomas	—	0	—	—
Sarnia	—	1	—	—
Sault Ste. Marie	—	−11	—	—
Simcoe	—	0	—	—
Sioux Lookout-A	−38	−33	−29	−24
Smith Falls	—	−16	—	—
Stratford	—	−3	—	—
Sudbury-C	−21	−17	−12	−5
Timmins-C	−30	−26	−22	−17
Toronto-C	−4	0	5	10
Toronto-A	−9	−4	1	6

City	Winter Design Temp., Deg. F.			
	1%	2½%	5%	10%
ONTARIO (Ctd.)				
Trenton	—	−11	—	—
Walkerton	—	−3	—	—
Welland	—	0	—	—
Windsor-A	0	3	7	11
Woodstock	—	−3	—	—
PRINCE EDWARD ISLAND				
Charlottetown-C	−6	−3	0	4
Summerside	—	−3	—	—
QUEBEC				
Arvida-C	−23	−19	−16	−11
Asbestos	—	−14	—	—
Chibougamau	—	−30	—	—
Chicoutimi	—	−19	—	—
Drummondville	—	−13	—	—
Grandby	—	−12	—	—
Joliette	—	−15	—	—
Knob Lake-A	−44	−40	−34	−30
Lac Megantic	—	−15	—	—
La Tuque	—	−22	—	—
Mont Joli-A	−14	−11	−8	−3
Mont Laurier	—	−21	—	—
Montreal-C	−12	−9	−6	−2
Montreal-A	−14	−11	−8	−4
Port Harrison	−43	−39	−35	−31
Quebec City-C	−16	−12	−9	−4
Rivière du Loup	—	−11	—	—
St. Hyacinthe	—	−12	—	—
St. Jérôme	—	−15	—	—
Seven Islands-A	−23	−20	−17	−12
Shawinigan Falls	—	−14	—	—
Sherbrooke-C	−15	−12	−9	−5
Sorel	—	−13	—	—
Three Rivers-C	−17	−13	−10	−5
Valleyfield	—	−12	—	—
Victoiraville	—	−14	—	—
SASKATCHEWAN				
Moosejaw	—	−32	—	—
N. Battleford	—	−36	—	—
Prince Albert-A	−48	−41	−37	−30
Regina-A	−39	−34	−30	−25
Saskatoon-A	−45	−37	−33	−26
Swift Current-A	−39	−33	−29	−24
Uranium City	—	−46	—	—
YUKON TERRITORY				
Dawson-C	−62	−56	−50	−39
Whitehorse-A	−49	−43	−37	−26

Tables save time in

Flash Steam Calculations

WILLIAM B. FOXHALL

To save the time and tedium of individual calculations involving flash steam, tables have been prepared covering a useful range of operating conditions. In addition, a table giving flash tank dimensions and capacities is presented for practical use in design of flash steam systems.

WHERE high temperature condensate or continuous boiler blowdown is available, there may be opportunities to make controlled use of flash steam. The energy in water at high pressure and near saturation temperature produces flash steam instantaneously when pressure is reduced below saturation. The amount of steam so produced depends on the enthalpy of water and steam at each temperature and pressure. Since enthalpy is not a straight line function of either temperature or pressure, there is no convenient designation of the amount of steam produced per unit of pressure drop. Calculations must be made from data pertaining to actual conditions.

As an example, if saturated water at 70 psia and 303 deg F with enthalpy of 272.6 Btu per lb is discharged into a tank maintained at 20 psia, it must immediately assume the saturation conditions of the lower pressure, 228 deg and 196.2 Btu per lb. Some of the energy which had formerly held the temperature at 303 deg is converted into latent heat of steam at the new temperature. The amount of energy so converted is 272.6 — 196.2 = 76.4 Btu per lb. Since the latent heat of steam at 20 psia is 960.1 Btu per lb, this excess heat is enough to produce 76.4/960.1 or 0.08 lb of steam per lb of high temperature condensate, or, in other words, 8% of the condensate will flash into steam at the lower pressure. A similar 50 lb drop in another range of the pressure scale, say from 100 to 50 psia, would produce only a 5.2% conversion to flash steam because of the non-linearity of the enthalpy function.

The first table, showing the amount of heat given up by condensate to flash steam at various pressure reductions, will save the time and tedium of individual calculations. The second table, converting this heat into percent of condensate flashed to steam, leaves nothing for calculation except interpolation when required. Both tables are based on absolute pressures.

One of the advantages of flash steam for either process or space heating is the fact that it is saturated and its latent heat is therefore readily available. This is a mixed blessing, however, since it introduces the problem of wetness both in generation and transport of the steam, especially so because of the almost explosive rapidity with which flash steam is disengaged from the hot condensate or continuous boiler blowdown. Such violent action may result in carryover of water droplets into the low pressure steam piping unless the area of disengagement and the point of steam exit from the flash tank are properly arranged.

An empirical formula used in flash tank design states that pounds of flash steam per square foot of water surface per hour are equal to 3 times absolute pressure on water. If this rule were applied to the free surface of

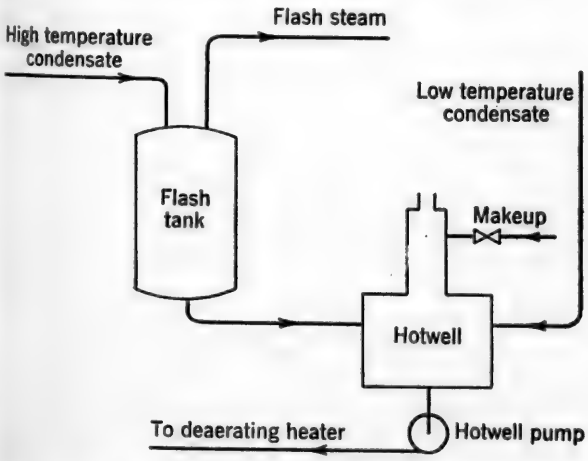


Fig. 1 Flow diagram for generation of flash steam from high temperature condensate returns.

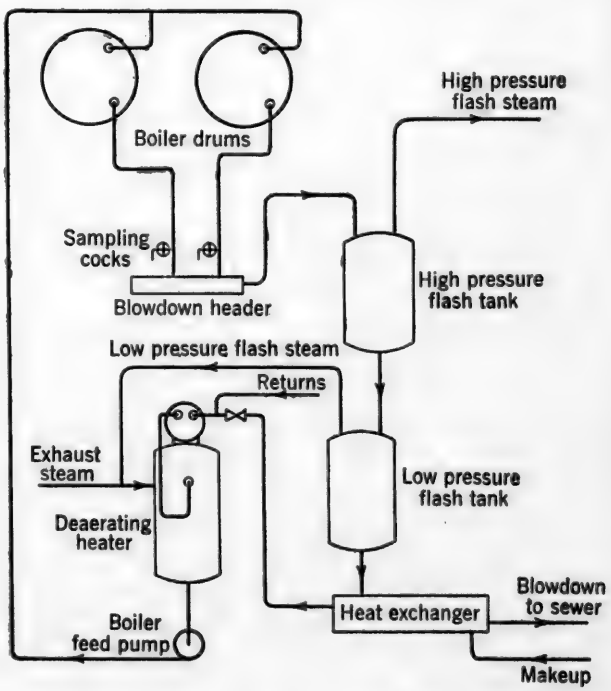


Fig. 2. Flow diagram for two-stage flash system based on heat in continuous boiler blowdown.

QUANTITY OF HEAT IN FLASH STEAM

High Pressure System			Pressure in Low Pressure System, Lb. per Sq. In. Abs.										
Sat. Pressure Lb. per Sq. In. Abs.	Saturation Temperature, Deg. F.	Enthalpy of Sat. Liquid, Btu per Lb.	1	5	10	14.7	20	25	30	35	40	45	50
			Total Heat in Flash Steam, Btu per Lb. of H.P. Condensate										
5	162.2	130.1	60.4	—	—	—	—	—	—	—	—	—	—
10	193.2	161.2	91.5	31.1	—	—	—	—	—	—	—	—	—
14.7	212.0	180.1	110.4	50.0	18.9	—	—	—	—	—	—	—	—
20	228.0	196.2	126.5	66.1	35.0	16.1	—	—	—	—	—	—	—
25	240.1	208.4	138.7	78.3	47.2	28.3	12.2	—	—	—	—	—	—
30	250.3	218.8	149.1	88.7	57.6	38.7	22.6	10.4	—	—	—	—	—
35	259.3	227.9	158.2	97.8	66.7	47.8	31.7	19.5	9.1	—	—	—	—
40	267.3	236.0	166.3	105.9	74.8	55.9	39.8	27.6	17.2	8.1	—	—	—
45	274.4	243.4	173.7	113.3	82.2	63.3	47.2	35.0	24.6	15.5	7.4	—	—
50	281.0	250.1	180.4	120.0	88.9	70.0	53.9	41.7	31.3	22.2	12.9	6.2	—
55	287.1	256.3	186.6	126.2	95.1	76.2	60.1	47.9	37.5	28.4	20.3	12.9	6.2
60	292.7	262.1	192.4	132.0	100.9	82.0	65.9	53.7	43.3	34.2	26.1	18.7	12.0
65	298.0	267.5	197.8	137.4	106.3	87.4	71.3	59.1	48.7	39.6	31.5	24.1	17.4
70	302.9	272.6	202.9	142.5	111.4	92.5	76.4	64.2	53.8	44.7	36.6	29.2	22.5
75	307.6	277.4	207.7	147.3	116.2	97.3	81.2	69.0	58.6	49.5	41.4	34.0	27.3
80	312.0	282.0	212.3	151.9	120.8	101.9	85.8	73.6	63.2	54.1	46.0	38.6	31.9
85	316.3	286.4	216.7	156.3	125.2	106.3	90.2	78.0	67.6	58.5	50.4	43.0	36.3
90	320.3	290.6	220.9	160.5	129.4	110.5	94.4	82.2	71.8	62.7	54.6	47.2	40.5
95	324.1	294.6	224.9	164.5	133.4	114.5	98.4	86.2	75.8	66.7	58.6	51.2	44.5
100	327.8	298.4	228.7	168.3	137.2	118.3	102.2	90.0	79.6	70.5	62.4	55.0	48.3
110	334.8	305.7	236.0	175.6	144.5	125.6	109.5	97.3	86.9	77.8	69.7	62.3	55.6
120	341.3	312.4	242.7	182.3	151.2	132.3	116.2	104.0	93.6	84.5	76.4	69.0	62.3
130	347.3	318.8	249.1	188.7	157.6	138.7	122.6	110.4	100.0	90.9	82.8	75.4	68.7
140	353.0	324.8	255.1	194.7	163.6	144.7	128.6	116.4	106.0	96.9	88.8	81.4	74.7
150	358.4	330.5	260.8	200.4	169.3	150.4	134.3	122.1	111.7	102.6	94.5	87.1	80.4
160	363.5	335.9	266.2	205.8	174.7	155.8	139.7	127.5	117.1	108.0	99.9	92.5	85.8
170	368.4	341.1	271.4	211.0	179.8	161.0	144.9	132.7	122.3	113.2	105.1	97.7	91.0
180	373.1	346.0	276.3	215.9	184.8	165.9	149.8	137.6	127.2	118.1	110.0	102.6	95.9
190	377.5	350.8	281.1	220.7	189.6	170.7	154.6	142.4	132.0	122.9	114.8	107.4	100.7
200	381.8	355.4	285.7	225.3	194.2	175.3	159.2	147.0	136.6	127.5	119.4	112.0	105.3
225	391.8	366.1	296.4	236.0	204.9	186.0	169.9	157.7	147.3	138.2	130.1	122.7	116.0
250	401.0	376.0	306.3	245.9	214.8	195.9	179.8	167.6	157.2	148.1	140.0	132.6	125.9
275	409.4	385.2	315.5	255.1	224.0	205.1	189.0	176.8	166.4	157.3	149.2	141.8	135.1
300	417.3	393.8	324.1	263.7	232.6	213.7	197.6	185.4	175.0	165.9	157.8	150.4	143.7
350	431.7	409.7	340.0	279.6	248.5	229.6	213.5	201.3	190.9	181.8	173.7	166.3	159.6
400	444.6	424.0	354.3	293.9	262.8	243.9	227.8	215.6	205.2	196.1	188.0	180.6	173.9
450	456.3	437.2	367.5	307.1	276.0	257.1	241.0	228.8	218.4	209.3	201.2	193.8	187.1
500	467.0	449.4	379.7	319.3	288.1	269.3	253.2	241.0	230.6	221.5	213.4	206.0	199.3
1000	544.6	542.4	472.7	412.3	381.2	362.3	346.2	334.0	323.6	314.5	306.4	299.0	292.3

QUANTITY OF HEAT IN FLASH STEAM (Continued)

High Pressure System			Pressure in Low Pressure System, Lb. per Sq. In. Abs.										
Sat. Pressure, Lb. per Sq. In. Abs.	Saturation Temperature, Deg. F.	Enthalpy of Sat. Vapor, Btu per Lb.	55	60	65	70	75	80	85	90	95	100	110
			Total Heat in Flash Steam, Btu per Lb. of H.P. Condensate										
60	292.7	915.5	5.8	—	—	—	—	—	—	—	—	—	—
65	298.0	911.6	11.2	5.4	—	—	—	—	—	—	—	—	—
70	302.9	907.9	16.3	10.5	5.1	—	—	—	—	—	—	—	—
75	307.6	904.5	21.1	15.3	9.9	4.8	—	—	—	—	—	—	—
80	312.0	901.1	25.7	19.9	14.5	9.4	4.8	—	—	—	—	—	—
85	316.3	897.8	30.1	24.3	18.9	13.8	9.0	4.4	—	—	—	—	—
90	320.3	894.7	34.3	28.5	23.1	18.0	13.2	8.6	4.2	—	—	—	—
95	324.1	891.7	38.3	32.5	27.1	22.0	17.2	12.6	8.2	4.0	—	—	—
100	327.8	888.8	42.1	36.3	30.9	25.8	21.0	16.4	12.0	7.8	3.8	—	—
110	334.8	883.2	49.4	43.6	38.2	33.1	28.3	23.7	19.3	15.1	11.1	7.3	—
120	341.3	877.9	56.1	50.3	44.9	39.8	35.0	30.4	26.0	21.8	17.8	14.0	6.7
130	347.3	872.9	62.5	56.7	51.3	46.2	41.4	36.8	32.4	28.2	24.2	20.4	13.1
140	353.0	868.2	68.5	62.7	57.3	52.2	47.4	42.8	38.4	34.2	30.2	26.4	19.1
150	358.4	863.6	74.2	68.4	63.0	57.9	53.1	48.5	44.1	39.9	35.9	32.1	24.8
160	363.5	859.2	79.6	73.8	68.4	63.3	58.5	53.9	49.5	45.3	41.3	37.5	30.2
170	368.4	854.9	84.8	79.0	73.6	68.5	63.7	59.1	54.7	50.5	46.5	42.7	35.4
180	373.1	850.8	89.7	83.9	78.5	73.4	68.6	64.0	59.6	55.4	51.4	47.6	40.3
190	377.5	846.8	94.5	88.7	83.3	78.2	73.4	68.8	64.4	60.2	56.2	52.4	44.1
200	381.8	843.0	99.1	93.3	87.9	82.8	78.0	73.4	69.0	64.8	60.8	57.0	49.7
225	391.8	833.8	109.8	104.0	98.6	93.5	88.7	84.1	79.7	75.5	71.5	67.7	60.4
250	401.0	825.1	119.7	113.9	108.5	103.4	98.6	94.0	89.6	85.4	81.4	77.6	70.3
275	409.4	816.9	128.9	123.1	117.7	112.6	107.8	103.2	98.8	94.6	90.6	86.8	79.5
300	417.3	809.0	137.5	131.7	126.3	121.2	116.4	111.8	107.4	103.2	99.2	95.4	88.1
350	431.7	794.2	153.4	147.6	142.2	137.1	132.3	127.7	123.3	119.1	115.1	111.3	104.0
400	444.6	780.5	167.7	161.9	156.5	151.4	146.6	142.0	137.6	133.4	129.4	125.6	118.3
450	456.3	767.4	180.9	175.1	169.7	164.6	159.8	155.2	150.8	146.6	142.6	138.8	131.5
500	467.0	755.0	193.1	187.3	181.9	176.8	172.0	167.4	163.0	158.8	154.8	151.0	143.7
1000	544.6	649.4	286.1	280.3	274.9	269.8	265.0	260.4	256.0	251.8	247.8	244.0	236.7

water at rest in the bottom of a tank, the resulting tank design would be conservative to the point of overdesign. Practice is to cascade the hot condensate into the disengagement chamber so that the whole surface of the falling stream presents a large interface for flashing. This offers an obvious economy in horizontal section of tank, and an obvious difficulty in accurate rational design.

Fortunately, experience has contributed to the design of flash tanks that work. These can be found in manufacturers' literature and standard references, including an article by T. W. Reynolds in the April, 1950, issue of this publication which contained a table giving flash tank dimensions for various steam capacities. The table is based on tanks provided with tangential inlets, flash pressure of 2 psig, and vent pipe diameters giving steam velocities leaving in the order of 11,000 fpm. Water storage space is one-third of the tank volume.

Assume a condensate return system returning 2750 lb of condensate per minute at 45 psia and flashing down to the pressure of a heating system at 5 psig or, approximately, 20 psia. From the second table, it is found that 4.9% of condensate flashes at this pressure. The specific volume of steam at 5 psig is 20.4 cu ft per lb. Hence, $2750 \times 20.4 \times 4.9\% = 2750$ cfm of steam flashed. In order to use the flash tank table, page 73, for flash steam

(Text continued on page 74)

PER-CENT OF CONDENSATE FLASHED TO STEAM

High Pressure System			Pressure in Low Pressure System, Lb. per Sq. In. Abs.										
			1	5	10	14.7	20	25	30	35	40	45	50
			Latent Heat in Flash Steam, Btu per Lb.										
Sat. Pressure, Lb. per Sq. In. Abs.	Sat-uration Temper-ature, Deg.F	Enthalpy of Sat. Liquid Btu per Lb.	1036	1001	982.1	970.3	960.1	952.1	945.3	939.2	933.7	928.6	924.0
			Volume of Steam, Cu. Ft. per Lb.										
			333.6	73.5	38.4	26.8	20.1	16.3	13.7	11.9	10.5	9.4	8.5
			Percent of High Pressure Condensate Flashed at Low Pressure										
5	162.2	130.1	5.8	—	—	—	—	—	—	—	—	—	—
10	193.2	161.2	8.8	3.1	—	—	—	—	—	—	—	—	—
14.7	212.0	180.1	10.7	5.1	1.9	—	—	—	—	—	—	—	—
20	228.0	196.2	12.2	6.6	3.6	1.7	—	—	—	—	—	—	—
25	240.1	208.4	13.4	7.8	4.8	2.9	1.3	—	—	—	—	—	—
30	250.3	218.8	14.4	8.9	5.9	4.0	2.4	1.1	—	—	—	—	—
35	259.3	227.9	15.2	9.8	6.8	4.9	3.3	2.1	1.0	—	—	—	—
40	267.3	236.0	16.0	10.6	7.6	5.8	4.4	2.9	1.8	0.9	—	—	—
45	274.4	243.4	16.7	11.3	8.4	6.5	4.9	3.7	2.6	1.7	0.8	—	—
50	281.0	250.1	17.4	12.0	9.1	7.2	5.6	4.4	3.3	2.4	1.4	0.7	—
55	287.1	256.3	18.0	12.6	9.7	7.9	6.3	5.0	4.0	3.0	2.2	1.4	0.7
60	292.7	262.1	18.5	13.2	10.3	8.4	6.9	5.6	4.6	3.6	2.6	2.0	1.3
65	298.0	267.5	19.1	13.7	10.8	9.0	7.4	6.2	5.2	4.2	3.4	2.6	1.9
70	302.9	272.6	19.5	14.3	11.3	9.5	8.0	6.7	5.7	4.8	3.8	3.1	2.4
75	307.6	277.4	20.0	14.7	11.8	10.0	8.5	7.3	6.2	5.3	4.4	3.7	3.0
80	312.0	282.0	20.4	15.2	12.3	10.5	8.9	7.7	6.7	5.8	4.9	4.2	3.5
85	316.3	286.4	20.9	15.6	12.8	11.0	9.4	8.2	7.2	6.2	5.4	4.6	3.9
90	320.3	290.6	21.3	16.1	13.2	11.4	9.8	8.6	7.6	6.7	5.8	5.1	4.4
95	324.1	294.6	21.7	16.5	13.6	11.8	10.3	9.1	8.0	7.1	6.3	5.5	4.8
100	327.8	298.4	22.1	16.8	14.0	12.2	10.7	9.5	8.4	7.5	6.7	5.9	5.2
110	334.8	305.7	22.8	17.5	14.7	12.9	11.4	10.2	9.1	8.2	7.4	6.6	6.0
120	341.3	312.4	23.4	18.2	15.4	13.6	12.1	10.9	9.9	9.0	8.2	7.4	6.8
130	347.3	318.8	24.0	18.9	16.0	14.3	12.8	11.6	10.6	9.7	8.9	8.1	7.4
140	353.0	324.8	24.6	19.3	16.6	14.9	13.4	12.2	11.2	10.3	9.5	8.8	8.1
150	358.4	330.5	25.2	20.0	17.2	15.5	14.0	12.8	11.8	10.9	10.2	9.4	8.7
160	363.5	335.9	25.7	20.6	17.8	16.0	14.5	13.4	12.4	11.5	10.7	10.0	9.3
170	368.4	341.1	26.2	21.1	18.3	16.6	15.1	14.0	12.9	12.1	11.3	10.5	9.9
180	373.1	346.0	26.7	21.6	18.8	17.1	15.6	14.5	13.4	12.6	11.8	11.0	10.4
190	377.5	350.8	27.1	22.1	19.3	17.6	16.1	15.0	14.0	13.1	12.3	11.5	10.9
200	381.8	355.4	27.6	22.5	19.7	18.0	16.6	15.5	14.4	13.6	12.8	12.1	11.4
225	391.8	366.1	28.6	23.6	20.8	19.1	17.7	16.6	15.6	14.7	14.0	13.2	12.6
250	401.0	376.0	29.8	24.6	21.8	20.2	18.7	17.6	16.6	15.8	15.0	14.3	13.6
275	409.4	385.2	30.4	25.5	22.8	21.1	19.7	18.6	17.6	16.7	16.0	15.3	14.6
300	417.3	393.8	31.3	26.4	23.6	22.0	20.6	19.5	18.5	17.7	16.9	16.2	15.5
350	431.7	409.7	32.8	28.0	25.2	23.6	22.2	21.1	20.2	19.4	18.6	17.9	17.3
400	444.6	424.0	34.2	29.4	26.8	25.1	23.7	22.6	21.6	20.9	20.1	19.4	18.9
450	456.3	437.2	35.4	30.7	28.0	26.4	25.1	24.0	22.8	22.2	21.5	20.8	20.1
500	467.0	449.4	36.6	31.9	29.3	27.7	26.1	25.3	24.4	23.6	22.8	22.2	21.6
1000	544.6	542.4	45.6	41.2	38.8	37.2	36.0	35.1	34.2	33.5	32.8	32.2	31.7

PER-CENT OF CONDENSATE FLASHED TO STEAM (Continued)

High Pressure System			Pressure in Low Pressure System, Lb. per Sq. In. Abs.										
			55	60	65	70	75	80	85	90	95	100	110
Sat. Pressure Lb. per Sq. In. Abs.	Saturation Temperature, Deg. F.	Enthalpy of Sat. Vapor, Btu per Lb.	Latent Heat in Flash Steam, Btu per Lb.										
			919.6	915.5	911.6	907.9	904.5	901.1	897.8	894.7	891.7	888.8	883.2
			Volume of Steam, Cu. Ft. per Lb.										
			7.8	7.2	6.7	6.2	5.8	5.5	5.2	4.9	4.7	4.4	4.05
			Percent of High Pressure Condensate Flashed at Low Pressure										
60	292.7	1177.6	0.6	—	—	—	—	—	—	—	—	—	—
65	298.0	1179.1	1.2	0.6	—	—	—	—	—	—	—	—	—
70	302.9	1180.6	1.8	1.1	0.6	—	—	—	—	—	—	—	—
75	307.6	1181.9	2.3	1.7	1.1	0.5	—	—	—	—	—	—	—
80	312.0	1183.1	2.8	2.2	1.6	1.0	0.5	—	—	—	—	—	—
85	316.3	1184.2	3.3	2.7	2.1	1.5	1.0	0.5	—	—	—	—	—
90	320.3	1185.3	3.7	3.1	2.5	2.0	1.5	1.0	0.5	—	—	—	—
95	324.1	1186.2	4.2	3.5	3.0	2.4	1.9	1.4	0.9	0.4	—	—	—
100	327.8	1187.2	4.6	4.0	3.1	2.8	2.3	1.8	1.3	0.9	0.4	—	—
110	334.8	1188.9	5.7	4.7	4.2	3.6	3.1	2.6	2.1	1.7	1.2	0.8	—
120	341.3	1190.4	6.1	5.5	4.9	4.4	3.9	3.4	2.9	2.4	2.0	1.6	0.8
130	347.3	1191.7	6.8	6.2	5.6	5.1	4.6	4.1	3.6	3.2	2.7	2.3	1.5
140	353.0	1193.0	7.5	6.8	6.3	5.7	5.2	4.7	4.3	3.8	3.4	3.0	2.2
150	358.4	1194.1	8.1	7.5	6.9	6.4	5.9	5.4	4.9	4.5	4.0	3.6	2.8
160	363.5	1195.1	8.7	8.1	7.5	7.0	6.5	6.0	5.5	5.1	4.6	4.2	3.4
170	368.4	1196.0	9.2	8.6	8.1	7.5	7.0	6.6	6.1	5.6	5.2	4.8	4.0
180	373.1	1196.9	9.8	9.2	8.6	8.1	7.6	7.1	6.6	6.2	5.8	5.4	4.6
190	377.5	1197.6	10.3	9.7	9.1	8.6	8.1	7.6	7.2	6.7	6.3	5.9	5.1
200	381.8	1198.4	10.8	10.2	9.6	9.1	8.6	8.1	7.7	7.2	6.8	6.4	5.6
225	391.8	1199.9	11.9	11.4	10.8	10.3	9.8	9.3	8.9	8.4	8.0	7.6	6.8
250	401.0	1201.1	13.0	12.4	11.9	11.4	10.9	10.4	10.0	9.5	9.1	8.7	8.2
275	409.4	1202.1	14.0	13.4	12.9	12.4	11.9	11.5	11.0	10.6	10.2	9.8	9.0
300	417.3	1202.8	15.0	14.4	13.9	13.3	12.9	12.4	12.0	11.5	11.1	10.7	10.0
350	431.7	1203.9	16.7	16.1	15.6	15.1	14.6	14.2	13.8	13.3	12.9	12.5	11.8
400	444.6	1204.5	18.2	17.7	17.2	16.7	16.2	15.8	15.3	14.9	14.5	14.1	13.4
450	456.3	1204.6	19.6	19.1	18.6	18.1	17.7	17.2	16.8	16.4	16.0	15.6	14.9
500	467.0	1204.4	21.0	20.5	20.0	19.5	19.0	18.6	18.2	17.7	17.4	17.0	16.3
1000	544.6	1191.8	31.1	30.6	30.2	29.7	29.3	28.9	28.5	28.1	27.8	27.5	27.0

FLASH TANK DIMENSIONS FOR VARIOUS STEAM CAPACITIES. (TANKS PROVIDED WITH TANGENTIAL INLET)

Tank No.	Tank Dia Ft	Steam Space Height Ft	Tank Vol. Cu Ft	Flashed Steam		Tank No.	Tank Dia Ft	Steam Space Height Ft	Tank Vol. Cu Ft	Flashed Steam	
				Cfm	Lb					Cfm	Lb
1	2.00	4.25	13	627	26	7	5.50	8.75	200	9400	397
2	2.66	5.50	28	1058	45	8	6.00	9.00	222	11360	480
3	3.33	6.66	58	1645	70	9	7.00	10.50	400	15667	662
4	4.00	7.83	98	2390	101	10	8.00	12.00	600	19192	811
5	4.50	8.16	116	4113	174	11	9.00	13.50	830	23892	1010
6	5.00	8.50	160	6658	281	12	10.00	15.00	1010	34858	1474

at 2 psig, difference in specific volumes must be accounted for. The ratio is 23.9/20.4 = 1.17, and 2750/1.17 = 2350 cfm. From the table, tank No. 4 provides the required dimensions to satisfy this capacity of flashed steam. If a tank with top inlet is used, the flash tank capacity is 70% of that given in the table. Therefore, if a top inlet tank were used under these conditions, tank No. 5 would be selected with a capacity of 2880 cfm.

Figures 1 and 2 show typical flow diagrams for flash steam systems. Figure 1 is a possible arrangement for generation of flash steam from high temperature condensate returns. Figure 2 is a two-stage flash system based on the heat in continuous boiler blowdown. Note that under this system, the liquid which does not flash into usable steam is, according to its original function, discharged to a sewer, whereas in a high temperature condensate flash system it becomes part of the boiler feedwater again.

Mark Twain Was Only Half-Right about the Weather

For almost 2000 years, nearly everybody has been trying to do something about it, according to Inside Carrier, dealer publication of Carrier Corporation.

If you think last summer was hot, you should have been around during the summer of 221 A. D. Official Weather Bureau records don't go back quite that far, but "oldtimers will tell you" the heat was so bad that Emperor Heliogabalus sent 1,000 servants into the mountains back of Rome to bring back snow which could be piled in cooling mounds around his garden.

During the 17 centuries that followed, enterprising heat-sufferers who were lacking in servants or mountains (or both) tinkered with other schemes for beating the heat that were generally more spectacular than effective. A sixteenth century wood cut shows a burly workman using a lever to actuate a rock-weighted bellows which forced fresh air into a mine. A copper engraving circa 1661 shows a dining table being fanned by an ingenious apparatus whose failure to crash the mass market could probably be blamed on the 300-pound weight which propelled it and a mechanism which required a room at least as big as the dining space to house it. And in the 18th century a group of notorious quacks wandered through China in hot weather selling "wind" to farmers at fancy prices.

These primitive approaches to controlling the air we live in were not confined to antiquity, however. Since the U. S. Patent Office was established, the records are full of patents which demonstrate the groping of U. S. inventive genius. In 1830 a Rube Goldbergish device conceived by T. M. McLean automatically dispensed wine, cracked nuts and paddle-propelled air simultaneously to the heat-prostrated lounger. In 1869 Charles Singer of South Bend hit on a method of harnessing the energy of America's rocking chairs to cool their occupants which involved a bellows attached to a stationary base on one side and to the see-sawing seat of the chair on the other, an imaginative arrangement designed to squirt air on the overheated pate of the person who did the rocking. And in 1872 J. B. Williamson of Louisville hit on the notion of taking a clock mechanism, rotating the pendulum 90 degrees as a paddle-type fan, and mounting the device on the headboards of beds to cool the sleepers and shoo flies at one and the same time.

Engravings of the heralded ventilating machine at the Philadelphia Exposition of 1876 show men pursuing their bowlers around the hall and women clinging to laminated layers of petticoats in the gale it created. Another stroke of genius which unfortunately came just a year too late for the Exposition was "the ventilated suit," a garment of fitted louvers that resembled a tailored venetian blind. Other brainstorms of the day produced an "ice chair" shaped like a sock and filled with cracked ice after the occupant was ensconced inside and a Cool Breeze Machine designed to dispense refreshing zephyrs on busy street corners at a nickel a breeze.

Most of the schemes of these early weathermakers never got beyond the pen and ink stage. Some actually got as far as working models. But at least one of these systems served as the basis for a company, with capital stock of $250,000, that actually existed and transacted business in the late 1880's. The firm was the American Ventilator Company of Boston, and the device they marketed was called the Individual Ventilator.

The Individual Ventilator, as described in the company catalog of 1887, contained one or two shortcomings which may explain why you won't find the company listed in Poor or Moody industrial indexes today. Air distribution was accomplished by means of two-inch brass pipes, "which may be nickel plated." Outside air forced through these pipes by steam or electrically-driven blowers was delivered to nozzles which could be placed in front of theater seats, over the tops of billiard tables, or attached to flexible hoses like an old-style dictaphone mike. These nozzles gave the appearance of a curious submarine peering through the top of a lunch counter or dining room table.

The catalog neatly side-steps the question of what happens when outside temperatures soar fifteen or twenty degrees above the temperature of the space to be cooled. The copy does imply that "lower temperatures may be had simply by connecting the supply pipe with an ice box," but has no suggestions as to where the ice is going to come from. One illustration shows air nozzles in one corner of a kitchen while the small steam engine which powered the blower chugged away energetically in another. Presumably the heat gain from the steam engine was offset by locating the outside air intake in Labrador.

But innocence of having a practical product did not mean that the top brass of American Ventilating hesitated to "pull out the stops" in advertising the system's many virtues, any more than it stopped the Chinese wind salesmen or the early American purveyors of snake oil. Their catalog employed the basically sound approach of creating a desire for its product that may give modern air conditioning advertisers pause. Copy played up benefits to the user, played down talk of nuts and bolts. Illustrations showed the product in use, the *sine qua non* of modern advertising. And its pages were liberally sprinkled with testimonials from enthusiastic users—an advertising technique as effective today as it was then.

AIR CONDITIONING, HEATING and VENTILATING'S

REFERENCE SECTION

SEPTEMBER, 1957

Control of Fan Systems in Large Buildings

JOHN E. HAINES
Vice President, Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

Automatic controls to provide various required regulation of fan systems used in large buildings

Control of Fan Systems in Large Buildings

JOHN E. HAINES
Vice President, Minneapolis-Honeywell Regulator Company, Minneapolis, Minn.

Controls are used in the operation of fan systems to regulate the working of equipment, along with control sequence and control interlock. They are part of a system to maintain stated conditions of temperature, pressure or humidity. Systems are described and diagrams presented to show how various controls are used to provide special regulation for definite objectives in large building operations.

The fan system, installed to provide air conditioning in today's large building, is a highly developed mechanical system. To obtain optimum performance from the system, automatic controls are used. These controls are designed, selected and installed to enable the fan system to maintain certain conditions of temperature, pressure, or humidity.

Automatic controls are also used to add safety to the system by preventing operation of the mechanical equipment under conditions that would be hazardous.

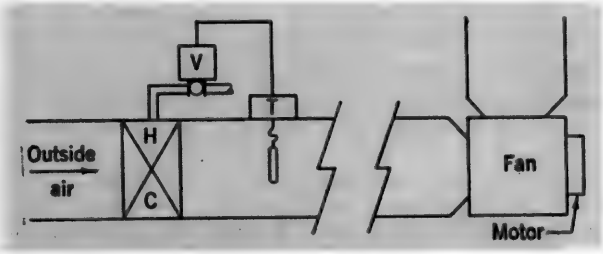


Fig. 1. Discharge control of a single preheat coil.

The mechanical system is made up of several component parts that are used in a variety of arrangements and in a number of different ways to obtain the desired results. While the several pieces of equipment can be considered separately, the method of control used is largely determined by the desired effect of the total system.

When more than one function is to be accomplished by the complete mechanical system, the engineer must see that it will operate as a completely coordinated unit. Proper arrangement of the equipment, selection of the controls, along with the control sequence and control interlock are all necessary to obtain this result.

To develop effective, properly coordinated control systems, the components of the mechanical system and their control will be considered separately. However, their effect on the balance of the system as well as their reason for being included must be considered. As the development of the system progresses, the segments will be combined and interlocks provided.

TEMPERING SYSTEM FOR VENTILATION ONLY

The tempering system may provide all outside air, or a mixture of outside air and return air to the space. The final control of the space temperature is accomplished through the use of direct radiation.

The simplest tempering system uses outside air only and may consist of any or all of the following parts which require control, or control interlock: Preheat coil, heating coil, and fan.

Preheat may be used as a source of energy for humidification; it may be used to keep the reheat coil from being too large; it is often used to prevent freezing air from entering the system.

On the 100% outside air system, the problem of freeze up must be considered. Since one of the most common approaches to freeze protection is the use of a preheat coil, its use will be considered here.

In the diagrams, the following abbreviations are used: *T*, thermostat; *H*, humidity controller; *P*, pressure control; *S*, switch; *M*, damper motor; *V*, valve; *HC*, heating coil; *CC*, cooling coil; *DXC*, direct expansion coil.

Single Preheat Coil. Figure I illustrates a preheat coil valve controlled by leaving air temperature. There are two main problems encountered: (1) the set point of the preheat coil control must be at a temperature low enough to prevent overheating; (2) the coil size, the valve size and the control point must all be selected to provide a load great enough to prevent freezing.

The second requirement is important regardless of the type of coil used. Usually, preheat coils are of the steam-distributing-type, commonly called a "non-freeze" coil. However, even the non-freeze coil will freeze if operated at light loads when the entering air temperature is below freezing.

Controls selected for this application are of the modulating type. Since the purpose of the preheat coil is to prevent air at or below freezing temperatures from entering the balance of the system, this arrangement would appear to be ideal as long as a sufficient load can be main-

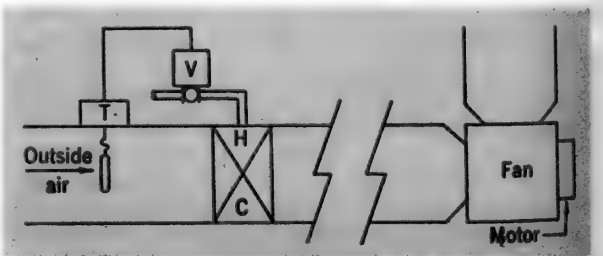


Fig. 2. Outside control of a single preheat coil.

tained. However, since a temperature gradient always exists, then if the coil is not completely full of steam, the control bulb can be so located that it permits either overheating or freezing.

If the control bulb is located at the supply end of the coil, it can be satisfied while the far end of the coil may be passing air below freezing. If the control bulb is too close to the opposite end of the coil, the average discharge temperature may be high enough to cause overheating.

Some engineers prefer controlling a preheat coil by outdoor air temperature as shown in Fig. 2.

Outside Control, Single Preheat Coil. The main advantage of outdoor control is the guarantee that the coil valve is completely open when freezing conditions exist. This does not prevent overheating if the coil pickup is too large.

When this arrangement is used, the control is sometimes specified as two-position. The valve is opened on a fall in temperature to 35 deg F. However, this causes a sudden shift in load on the balance of the system when so much heat is added suddenly.

To provide a gradual change in load, the experienced control engineer prefers the use of modulating type control. The controls are adjusted to start opening the valve at an outside temperature of 40 deg. The valve is gradually opened as the outside temperature falls reaching the complete open position at 35 deg outside temperature. In this way the sudden shock to the system

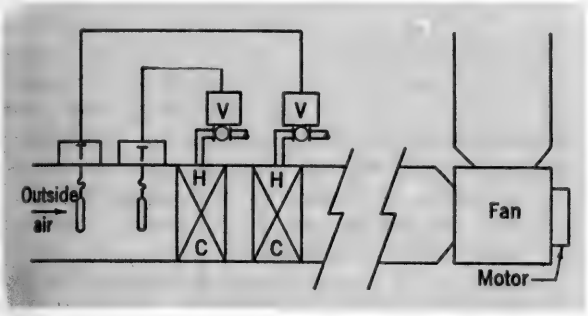


Fig. 3. Outside control of multiple preheat coils.

is avoided. On a rise in outside temperature the sequence is reversed. The valve starts to close at 35 deg, closing gradually as the outside temperature increases, reaching the closed position at a temperature of 40 deg outside.

With a coil sized for a pickup of 35 deg or greater, the leaving air temperature will be at or above a desirable space temperature. For this reason it is wise to select

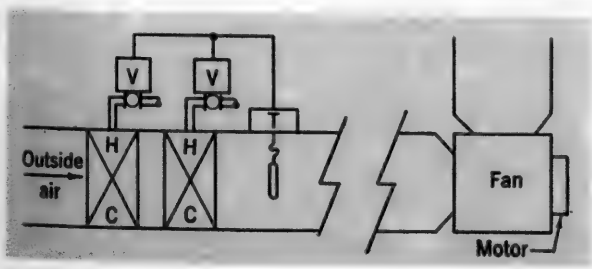


Fig. 4. Discharge control of multiple preheat coils.

John E. Haines, vice president, Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., has served in various executive capacities with this company since he received his B.S. in Ch. E. from Purdue University in 1925. He is the author of Automatic Control of Heating and Air Conditioning, published by McGraw-Hill Book Co. in 1953. In 1955 he served as president of the ASHAE. Beside this society, he is a member of ASRE, ASME, Building Research Advisory Board, National Sales Executives and the Executive Committee of the Producers' Council. He is a member of the Minneapolis Club. In addition, he is co-chairman, Joint Committee, ASHAE-AIA; co-chairman, Joint Committee, Producers' Council-Consulting Engineers Council; member, Joint Committee, Producers' Council-AIA. He is chairman ASHAE Long Range Planning and Honors and Awards Committees.

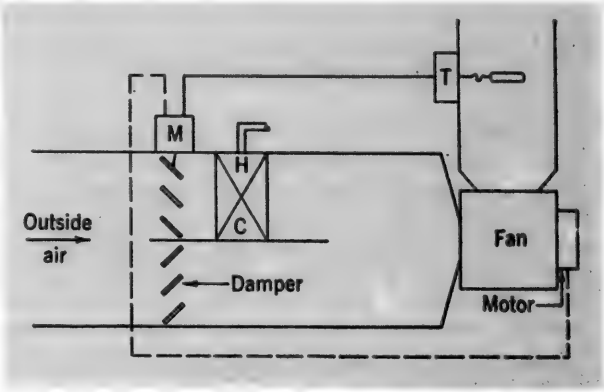


Fig. 5. Face and bypass damper control on pull-through tempering system.

preheat coils with a maximum pickup of 30 deg. For greater pickups, the use of multiple coils is recommended.

Control for Multiple Preheat Coil. The preheat coils shown in Fig. 3 are controlled by separate controllers which are set to insure that freezing air does not enter any coil which is not completely filled with steam.

Discharge Control. If discharge control of multiple preheat coils is desired, a single controller can be used, provided the valves are sequenced so that the valve on the first coil is completely open before the valve on the second coil starts to open. See Fig. 4.

Modulating or proportional control should be used with the multiple preheat coil, for the same reason mentioned before.

Freeze-up protection is often obtained by using face and bypass dampers in place of the preheat coil.

Face and Bypass Dampers. On the system shown in Fig. 5 discharge control is obtained by operation of the face and bypass dampers. The controls selected for this application are of the modulating type. The two dampers operate in opposite directions. As the heating load increases, the face damper gradually opens and the bypass damper gradually closes. This reduces the amount of bypass air and increases the flow of air through the coil. In this way a constant discharge temperature is maintained. There is no danger of freezing the coil as it is full of steam at all times.

Care should be exercised in locating the control bulb. Locating the control bulb down stream of the fan is recommended. However, even here, stratification will still exist on some systems.

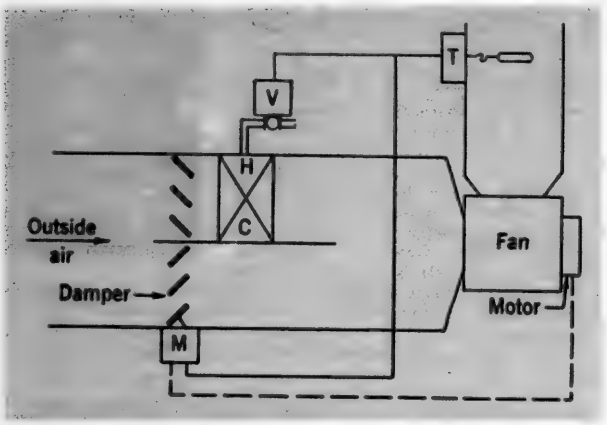


Fig. 6. Face and bypass damper control with steam valve on pull-through tempering system.

An interlock with the fan motor can be provided to close the face damper when the fan is shut down.

The best commercially manufactured dampers do not provide 100% shut off. Therefore, when the dampers are in a position calling for all the air to bypass the coil, some air will still pass through the face damper and the coil. This damper leakage results in overheating in mild weather. In order to eliminate mild weather overheating, provisions for final shut off of the steam supply should be added.

Modulating Type Steam Valve. The system illustrated in Fig. 6 is the same as that shown in Fig. 5 except for the addition of a modulating type steam valve. The action of the valve and damper motor is so arranged that as the damper position changes to call for more bypass air, the valve throttles the amount of steam being admitted to the coil. If the air bypassing the coil is reduced, forcing more air through the face damper and coil, the steam valve opens.

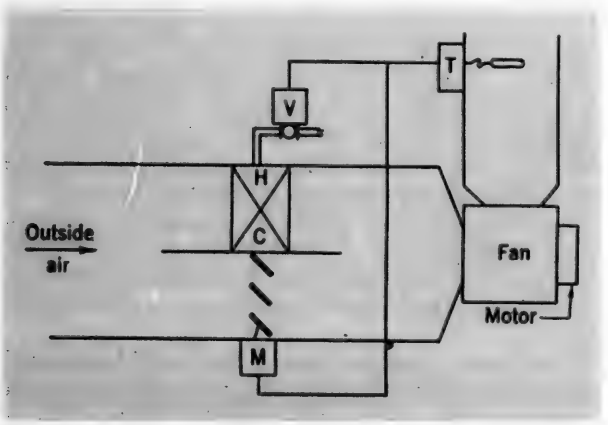


Fig. 7. Bypass damper and steam valve control on pull-through and tempering system.

If the heating load is increasing, it is desirable to have the steam valve completely open before all the air is forced through the coil. If this sequence is followed, the coil will always have steam when freezing conditions exist.

When the heating load decreases, the valve should reach the closed position at the same time as the dampers call for full bypass air. This prevents overheating in mild weather as experienced when the system in Fig. 5 is used.

If the system were designed for use in an area with a mild climate, one where freezing conditions will not be experienced, the face damper can be eliminated as shown in Fig. 7.

Bypass Damper and Steam Valve Control. In the system of Fig. 7, the steam valve and the bypass damper are modulated together. The control bulb is, again, located down stream of the fan. On light loads the steam valve throttles the steam to the coil at the same time the bypass damper approaches the open position.

There is no danger of overheating under light load conditions because the steam to the coil is completely shut off when the outside air temperature rises to the setting of the discharge control.

Preheat and Reheat Control. Any of the systems, or system parts, previously discussed may be combined as design conditions require. For example, one or more preheat coils may be used in conjunction with discharge control of an additional coil as shown in Fig. 8. An outside air damper has also been added. The damper opens when the fan is turned on and closes when the fan is turned off.

Variation of Previous System. Another common combination is that shown in Fig. 9. With this system it is necessary to provide some form of mixing in order to have a good location for the preheat control bulb. The two-position outside air damper has again been added.

TEMPERING SYSTEMS WITH RETURN AIR

A tempering system is normally used to introduce fresh air for ventilation. While this can be accomplished with the 100% fresh air unit, several advantages can be obtained by using return air. Some of the advantages obtained are of follows:

1. Mixed air can be used for freeze-up protection.
2. Fast, economical pickup of building temperature after night shutdown.
3. More air is moved through the system, providing better distribution and reducing stratification.
4. More effective atmospheric cooling can be obtained because of the increased amount of air handled by the system.
5. Mechanical cooling can be added while maintaining a practical, economically sound system.

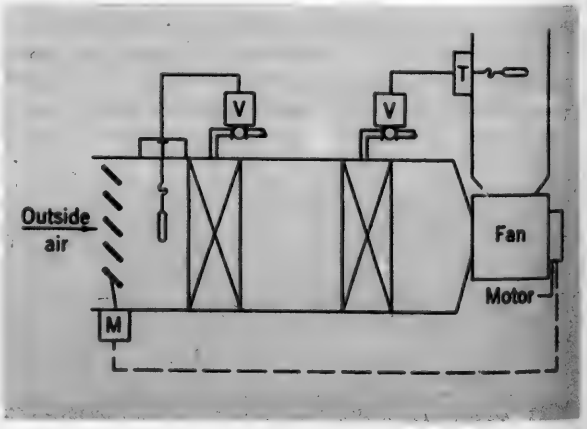


Fig. 8. Outside control of preheat with discharge control of reheat.

The first segment of the tempering system with return air, that is to be considered, is the fresh air damper.

Fixed Amount of Outdoor Air. Figure 10 illustrates a system that furnishes a fixed percentage of outside air whenever the fan is in operation. The damper motor is of the two-position type. It is interlocked with the fan motor power supply so that it opens whenever the fan is running and closes whenever the fan stops. Since this system does not provide for adjusting the ratio of outside and return air, it is seldom used.

By adding a return air damper and changing the type of control, as shown in Fig. 11, the percentage of outside air can be adjusted by a positioning switch. The positioning switch can be located at any convenient point in the building.

Adjustable Outdoor and Return Air. This system uses a modulating type damper motor. The damper motor is interlocked with the fan motor to provide a closed outdoor air damper, and an open return air damper, whenever the fan is shut down. The outside air damper will open to the position indicated by the manual positioning switch whenever the system is in operation.

This arrangement is often used on systems designed for theaters, auditoriums or similar spaces with a variable occupancy factor. The amount of outdoor air can be increased for a large crowd or decreased for a small crowd.

System with Override Controls. Figure 12 shows the addition of override controls to the system shown in Fig. 11. To provide fast, economical pickup of building temperatures, a return air control is often specified. The action of the return air control is such that the outside air damper will remain closed whenever the return air is below a desired temperature.

A mixed air control may be added to provide additional outside air whenever the mixed air temperature rises above a desired temperature. In this system, the positioning switch, the damper motor, and the mixed air control are of the modulating type. The return air control is a two-position controller.

If the system is set in operation in a cold building, the following sequence will apply.

1. The outside air damper would be closed and the return air damper open at start-up.
2. As the building comes up to temperature, the return air temperature will rise to the set point of the return air control. (A typical setting is 68 deg.) At this point the outside air damper will open to the position indicated by the manual switch. The return air damper will be in a corresponding position.
3. If the mixed air temperature rises to the set point of the mixed air control, the dampers will be repositioned as required to maintain a constant temperature. The dampers will be in a 100% outside air position whenever the outside temperature is at or above the set point of the mixed air control.
4. The outside air damper will close and the return air damper will open whenever the fan is shut down.

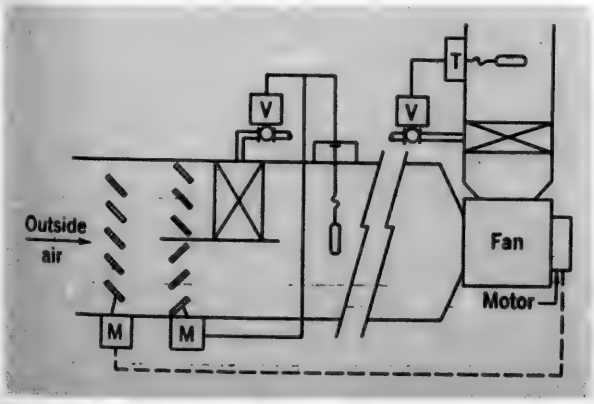


Fig. 9. Face and bypass damper preheat control with discharge control of reheat.

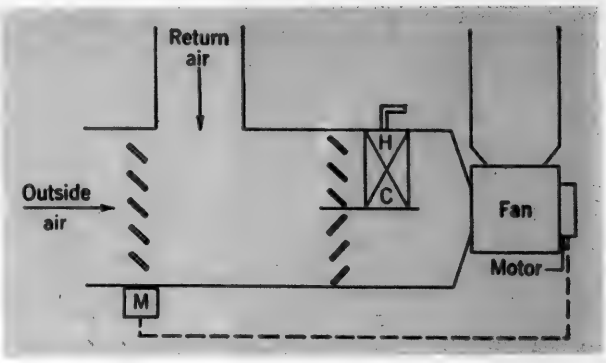


Fig. 10. Fixed percentage of outside air.

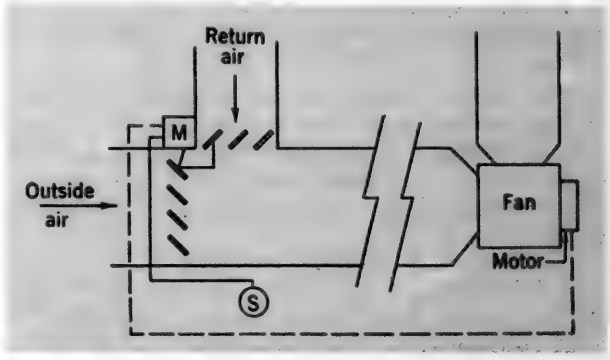


Fig. 11. Adjustable outdoor and return air system.

The use of the mixed air control is satisfactory, when set a few degrees below the desired space temperature, to provide the maximum available atmospheric cooling in mild weather. However, if given a higher setting, it takes over from the manual switch a greater part of the time. It is necessary to consider stratification when selecting and locating the control.

On fan systems where mixed air control is used, one form of mixing sometimes used is the blow-through system. If the reason for using a blow-through system is to obtain mixing, the fan should be selected with this in mind. A single-inlet centrifugal fan provides better mixing than the double inlet fan. An axial flow fan will usually provide better mixing than either type centrifugal fan.

Control in Blow-Through System. Figure 13 illus-

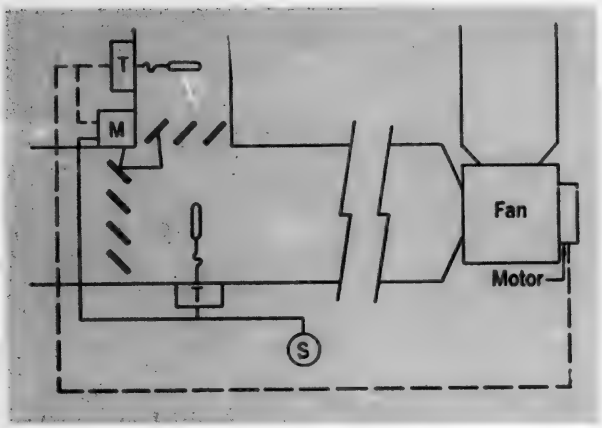


Fig. 12. Adjustable outdoor and return air system with return air and mixed air override.

trates a mixed air control of outside and return air dampers without a minimum positioning control.

The system illustrated provides:

1. A closed outside air damper on fan shut down.
2. An open return air damper on fan shut down.
3. Constant temperature of mixed outdoor and return air.
4. Modulating damper motor positioned by the modulating mixed air control whenever the fan is running.
5. No fixed minimum amount of fresh air.

This system provides the advantage of fairly good mixing because of the blow-through design. The blow-through design could be used with other systems previously discussed. Another advantage of this system of damper control is the constant load to the balance of the system.

This system also provides atmospheric cooling whenever it is needed and available, as long as the set point of the controller is below the desired space temperature.

A disadvantage to this system is the small amount of fresh air introduced in cold weather. For example, with an outside air temperature of 0 deg and a return air temperature of 70 deg, only 7.2% outside air is used if the control is set at 65 deg. The usual outside air requirement is from 25% up to 50%. If a minimum amount of fresh air is required, a minimum positioning switch can be added as shown in Fig. 12.

On all fan systems that introduce outside air to a building, the design engineer must determine how an equivalent amount of air is to leave the building. A slight positive pressure with some air escaping through door and window cracks is desirable. However, these cracks will not replace an exhaust system.

Adjustable Control with Exhaust Control. An exhaust system can be, simply, strategically located gravity dampers, or it can be one or more exhaust fans.

Figure 14 shows a motorized exhaust damper with the excess air leaving the return air duct. The motorized exhaust damper, as used here, is of the modulating type and will operate the same as the outside air damper. When used in this way a slight positive pressure is maintained due to the resistance to flow present in the return air duct system. Once it is determined what damper sequence is to be used, the load on the rest of the system can be determined. The same factors as previously discussed would determine the selection of the controls to be used for the steam coil. Figure 15 shows a complete system using damper control as shown in Fig. 14 and coil control as shown in Fig. 6. Other combinations can be selected to fit almost any design requirements.

VARIABLE DISCHARGE TEMPERATURE CONTROL

In all of the systems developed so far, a constant discharge temperature has been used. While a constant discharge temperature for tempering systems is often specified and used, there are advantages to be gained by automatically increasing the discharge temperature as the heating load increases.

In order to understand the full value of these advantages, the difference between building, or space, temperature as compared to the "no heat" temperature should be kept in mind. The "no heat" temperature is the outside temperature at which it is no longer necessary to add heat to a building to maintain the desired building temperature.

The difference between the two temperatures may be slight or it may be as high as 30 to 40 deg depending upon internal heat gain, building construction and sun exposure.

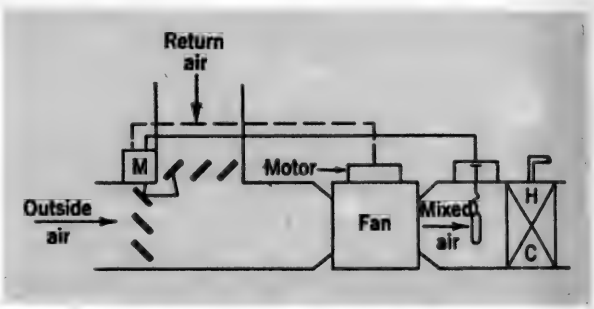


Fig. 13. Mixed air control of outside air in blow-through system.

By using an example in which the desired building temperature is 75 deg, the problem of selecting the control point for a constant discharge temperature can be seen.

If the discharge temperature is 75 deg, the building

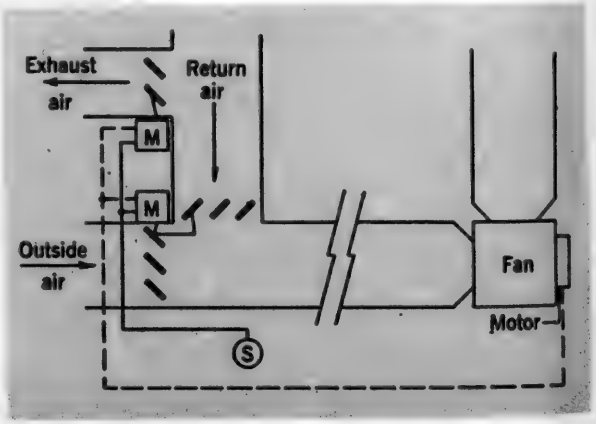


Fig. 14. Adjustable outside and return air control with exhaust damper.

will be overheated whenever the outside temperature is above the no heat point.

If the discharge temperature is below 75 deg, the radiation will have to carry an additional heating load when outside temperature is below the no heat point.

By using a master-submaster control combination, the discharge temperature can be changed as the outside temperature changes. Other advantages are also available through the use of a variable discharge temperature.

Discharge Temperature Reset Schedules. By using a schedule similar to that shown in Fig. 16, the size or amount of radiation required can be reduced. Also, there will be less complaint of cold drafts if the higher set up of discharge temperature is used. In mild weather, moving air at 75 deg may not be objectionable. However, as the weather gets more severe, some people will find any air movement at this temperature objectionable. Therefore, comfort conditions can be improved by raising the discharge temperature.

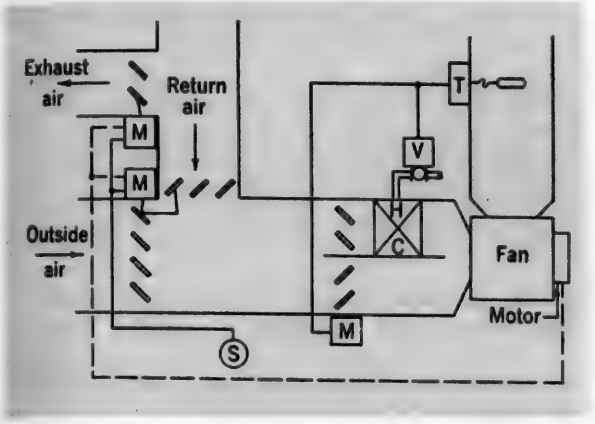


Fig. 15. Adjustable outdoor and return air control with face and bypass discharge temperature control.

There is a trend toward the use of more and more glass in today's construction. The use of glass adds to the sun effect changing the desirable setup schedule as the outside conditions change. This problem will affect the design engineer's decision as to the reset schedule to be selected. The engineer may find that it is desirable to compensate the setup schedule for solar effect. This can be done with both electric and pneumatic controls. However, recent

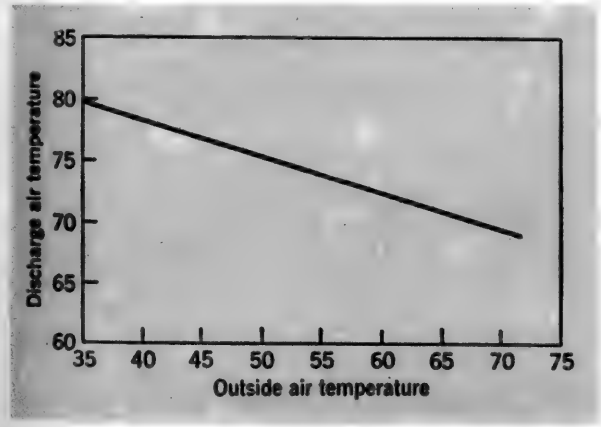
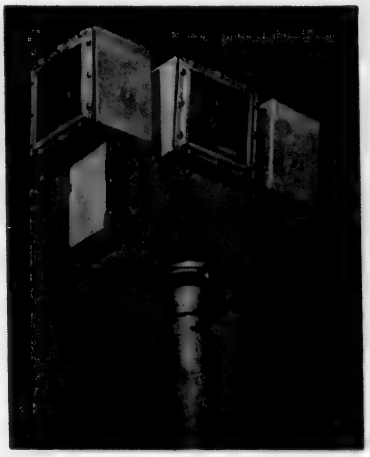


Fig. 16. Discharge temperature reset schedules.

Fig. 17. Solar compensated electronic element.



developments in electronic control systems provide a method of solar compensation that is far superior because of the ease with which it can be adjusted.

Solar Compensated Element. Central systems providing reset of discharge temperature are of the modulating type. If the reset is from outside temperature only, there will be control elements located in both the outside air duct and the discharge air duct. If the reset schedule is to be solar compensated, the outside element must be located outside and given the same sun exposure as the area of the building being served by the fan system. An actual installation which has three zones of solar compensation is shown in Fig. 17.

FREEZE-UP PROTECTION FOR ABNORMAL CONDITIONS

Freeze-up protection has been discussed as the foregoing systems have been developed. However, it has been assumed that a constant steam pressure has been available and that all equipment is functioning properly. In practice this is not always the case. Steam pressure may drop for any of a number of reasons, or a steam trap may plug up and fail to operate.

If the system is to be protected under these abnormal conditions, the fan should be shut down and the outside air dampers should be closed.

Any of a number of controls can be used to interrupt the power to the fan motor. However, the location of the control element is difficult to determine because of stratification of the air and the temperature gradient across the coil. Because of this problem special controls have been developed for this application.

Freeze-up Protection. The control that is illustrated in Fig. 18 is particularly well adapted for use as a freeze-up safety control because it will respond to the lowest temperature to which any portion of the 20 ft temperature sensitive element is exposed.

Some typical methods of installation are:

1. Locate control element in mixed air ahead of heating coils in central fan systems.
2. Install the control element over the face of a heating coil.
3. The control element is sometimes immersed in the return line and lower tube of a hot water heating coil.

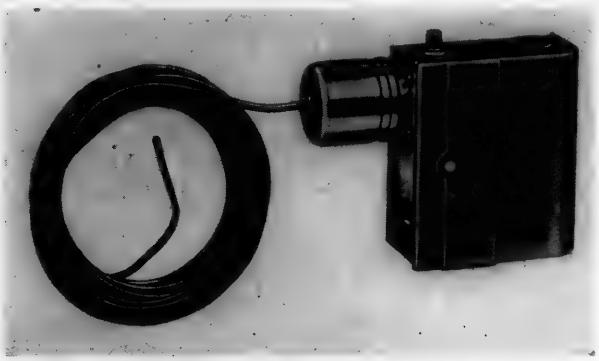


Fig. 18. Safety control used for freeze-up protection.

Regardless of the method of installation, this control would be used to stop the fan motor on any of the fan systems discussed so far. Since the fresh air damper is interlocked with the fan motor, the fresh air damper would close.

The instrument shown is available with alarm circuit and a manual reset feature.

CENTRAL FAN HEATING SYSTEMS

The fan systems considered to this point have been of the tempering type. It has been assumed that additional heat has been added to the building or space by room radiation. Some spaces, such as auditoriums and theaters, are easier to heat by increasing the size or capacity of the fan system. When this is done, the system is often referred to as a blast heating system.

When designing a central fan heating system, it is necessary to:

1. Select a heating coil with a capacity capable of increasing the discharge temperature to a point that will allow actual heating within the space served by the fan system.
2. Use a controller to measure and control the space temperature.

The automatic control sequence for a typical central fan heating system should provide the following functions:

1. On a fall in space temperature, the steam valve and dampers should change position gradually to provide additional heat.
2. On a rise in space temperature, the position of the steam valve and dampers should change gradually to reduce the amount of heat.
3. On a continued rise in temperature, atmospheric cooling should be provided.
4. A change in discharge air temperature should be measured by a discharge controller used to add control stability to the system as well as prevent discharging cold air into the space.
5. The system should provide protection against freezing of the heating equipment.

Return Air Control of Heating and Ventilating System. Figure 19 illustrates return air control of a blast heating and ventilating system. The return air control is the primary controller. The discharge control will over-ride the return air control if the discharge air temperature drops to the set point of the controller. Ventilation is provided by a combination of a minimum positioning switch and a mixed air control for this type installation.

Return air controllers are frequently chosen in preference to room thermostats because of the following deciding factors:

1. Cost of installation is reduced.
2. In general, the return air represents a good average of temperature conditions throughout the space for the control element to measure.

There are, however, factors that should be considered before selecting a return air control in preference to a space thermostat.

1. Are the return air grills located to take air from the entire space?

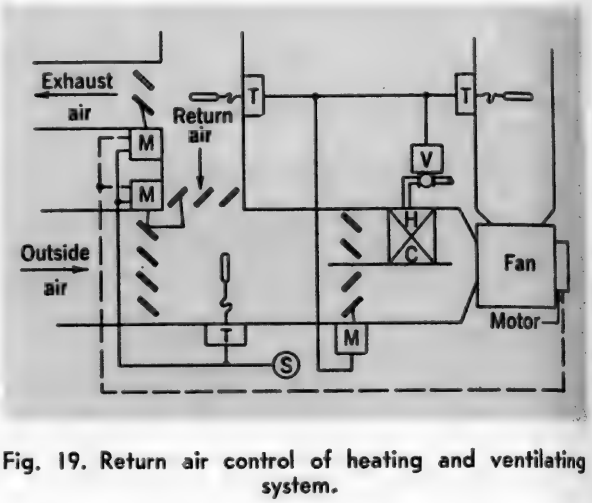


Fig. 19. Return air control of heating and ventilating system.

2. Is there any change of temperature in the return air duct?
3. Is the air distribution adequate to prevent the introduction of a significant system lag?
4. Is there a good room thermostat location available?

ZONE CONTROL WITH BOOSTER HEATING COILS

The design and control of the tempering systems so far developed are applicable as component parts to systems using multiple booster heating coils. The use of multiple booster heating coils also permits zoning of a central fan heating system.

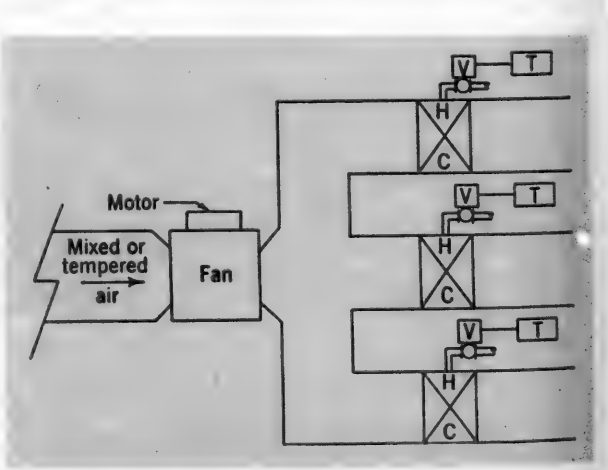


Fig. 20. Zone control with booster heating coils.

Zone Control with Booster Heating Coils. The system illustrated in Fig. 20 has the advantage of providing a constant volume of air to each space. This constant volume provides constant distribution facilitating balancing of the system. The temperature of the air is determined by the room thermostat operating a modulating type steam valve.

This type of system can be used for almost any number or size or zones. As long as the tempered air is controlled properly, the system will provide cooling, whenever necessary, to any zone in the system. By maintaining a constant air volume, full ventilation is maintained whenever the fan is in operation.

The system illustrated in Fig. 20 is often referred to as a constant volume, variable temperature zone system.

ZONE CONTROL WITH MULTIPLE MIXING DAMPERS

Tempered air or mixed air systems again form components of a heating system when hot deck and bypass dampers are used as shown in Fig. 21.

Multiple Mixing Dampers. All controls in this system are of the modulating type. A single coil, or group of coils, in the hot deck furnishes heat for the entire system.

If a single steam coil is used, it is very difficult to control the hot deck temperature in mild weather because of the temperature gradient across the face of the coil. The temperature gradient also may result in overheating the zone near the supply end of the coil and at the same time underheating the zone at the far end of the coil. The overheating is caused by damper leakage as previously discussed.

The pipe arrangement shown in Fig. 21 is for a hot water system. The three-way control valve and the circulator are arranged so that the coil always has a constant flow of water through it. In this way the temperature gradient is eliminated. On a rise in hot deck temperature, the valve gradually moves to pass more bypass water and less hot water. This results in cooler water going through the coil, descreasing the discharge temperature. On a fall in discharge temperature, the valve moves to pass more hot water and less bypass water, raising the coil water temperature.

Even on a water coil, overheating in mild weather would result if the hot deck temperature were maintained at a temperature high enough to heat in cold weather.

By using a "Master-Submaster" system to control the

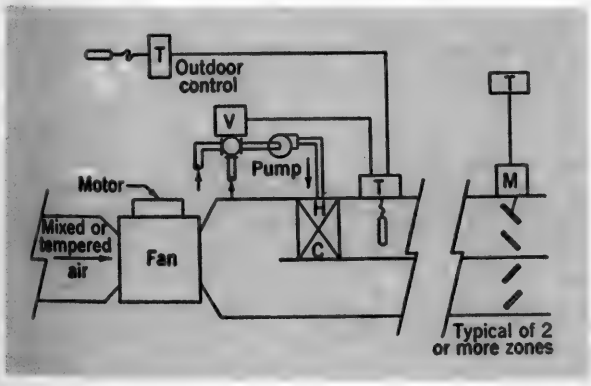


Fig. 21. Zone control with multiple mixing dampers.

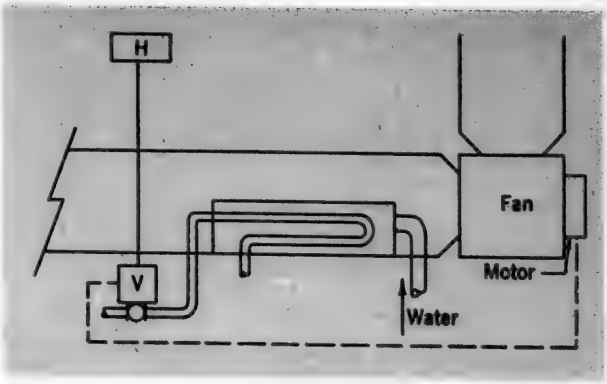


Fig. 22. Space control of pan humidifier.

hot deck temperature, better control can be obtained. It is desirable to select a schedule of temperatures that starts low in mild weather and gradually increases as the outside temperature drops. If the rate of setup is properly selected the majority of the zone mixing dampers

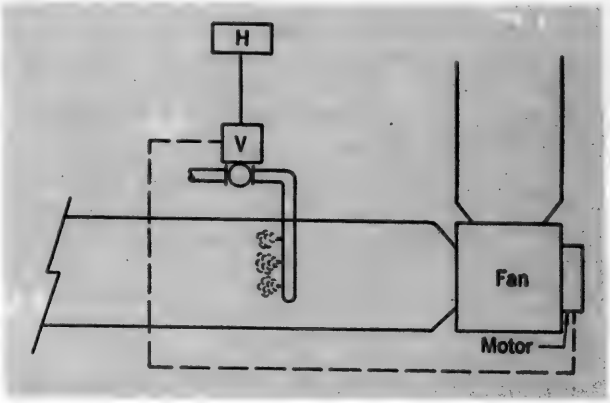


Fig. 23. Space control of steam jet humidifier.

will always control near the mid-position. That is, most of the zones will call for approximately 50% hot deck air and 50% bypass air. Because of shifting outside conditions, some dampers may call for considerably greater portions of hot deck air at different times of the day.

The hot deck temperature must always be hot enough to heat the coldest zone.

The mixing damper zone system is often used on installations of from two to ten zones. Unless two ducts, for both hot deck and bypass air, are run throughout the building, it is difficult to locate many dampers.

By careful selection and sizing of the components in the coil and bypass section, variations in volume can be maintained.

SELECTION OF ZONE — SIZE AND AREA

A control system may seem to be in perfect operation, maintaining a constant temperature at the thermostat location. However, other areas within the zone may be:

1. Too hot.
2. Too cold.
3. Alternately too hot and too cold.

An area that is always too hot can, within fan system limits, be corrected by decreasing the flow of air to the hot area.

An area that is always too cold can, within fan system

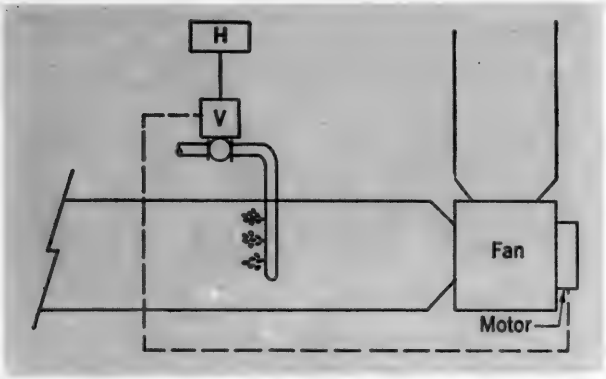


Fig. 24. Space control used with atomizing water spray humidifier.

limits, be corrected by increasing the flow of air to the cold area.

However, an area that is first hot and then cold, possibly due to a change in sun location, should not have been included as part of the zone.

In order to avoid troubles of this type, the design engineer should consider the following factors as he determines the area to be served by each zone and the number of zones to be used.

1. Wind velocity.
2. Wind direction.
3. Solar radiation.
4. Outdoor temperatures.
5. Use.
6. Occupancy—type and degree.
7. Temperatures to be maintained.
8. Construction.
9. Economic factors that may cause a change in the system design.

Inside Load Variations. The use and occupancy of a building are often the first factors considered when zoning a building. The internal loads may vary in one part of a building as compared to another part during the day, or from day to day, or from season to season. The variations may be caused by differences in:

1. Time of occupancy.
2. Amount of occupancy.
3. Temperatures desired by the occupants.
4. Contributions of uncontrolled sources of heat such as office equipment or special lighting.

The design engineer must consider the variations and determine just how much and in what direction the heating or cooling load will vary.

Outside Load Variations. Outside load variations with respect to different parts of the building are those caused by the sun and the wind.

When considering solar effects alone, a building would have to be divided into a minimum of four zones. In the morning the east side of a building will receive heat from the sun when the west side does not. The opposite is true in the afternoon. The south side of a building will be affected more at about noon than any other time of the day, while the north side will seldom, if ever, be affected during the winter months.

The windward side of a building will lose heat faster than the side away from the wind. Therefore, it is necessary to consider prevailing wind directions when selecting zones.

Construction. How high a building is, along with the design of the stair wells and elevator shafts, affects the zone selection because heat always rises within a building.

A trend in modern construction calls for more use of glass in outer walls. Larger glass areas increase the sun and wind effect. This requires the use of more zones in order to maintain constant temperatures.

Number of Zones. When all of the previously mentioned factors are considered, it becomes obvious that the ideal zoning procedure is to make each room or small area a zone. This is virtually a necessity in today's modern apartment building, office building, school and hospital. However, because of the economic factor and the less stringent requirements of temperature control, it is not always practical for buildings of the warehouse or storage building type.

HUMIDITY CONTROL

Humidification, especially in winter, is one of the requirements of a complete fan system. The control of the equipment used can be considered as a separate problem. However, to obtain the desired results it must be properly coordinated with the rest of the fan system.

Humidification requires energy, in the form of heat, to complete the process. The heat may be contained in water or in the air used in the process.

The four types of humidifiers in common use are:

1. Pan humidifiers.
2. Steam jet humidifiers.
3. Atomizing water spray humidifiers.
4. Air washers.

Pan Humidification. Figure 22 illustrates a pan humidifier. The water level is maintained by a float valve in the water supply. Steam is used as a source of energy to evaporate the water into the air.

The space humidity controller positions a modulating steam valve in accordance with space demands. A normally closed steam valve is used and an interlock with the fan is provided.

The water in the pan humidifier should not boil violently. Therefore, the capacity is limited and the response is slow. Experience shows that the best results are obtained with steam pressures above 5 psi gage and below 15 psi gage.

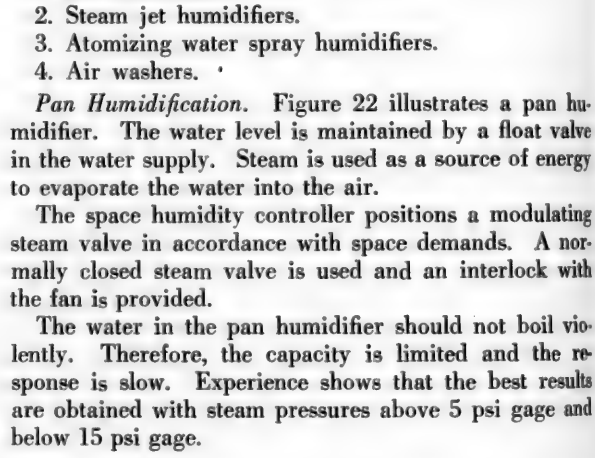


Fig. 25. Dewpoint control of air washer — 100% outside air unit.

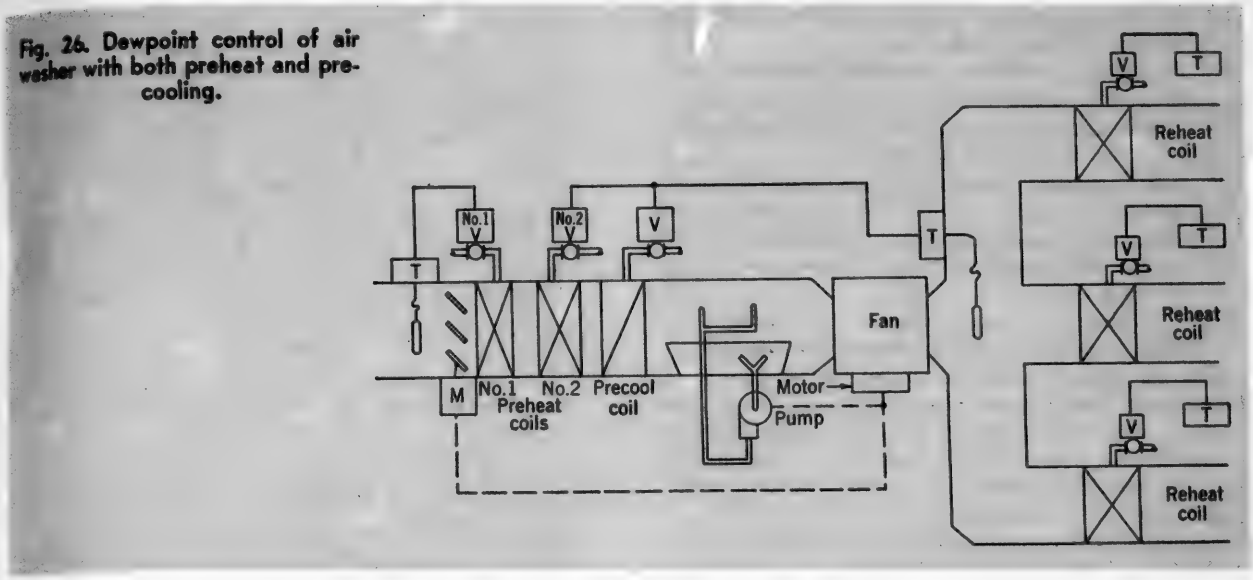


Fig. 26. Dewpoint control of air washer with both preheat and precooling.

Two-position control of the pan humidifier should only be used where wide variations in relative humidity are permissible.

Humidifiers can be located in the zone ducts of the systems shown in Fig. 20 and 21 if zone control of humidity is to be provided. A single humidifier can be located ahead of the fan if control from a single point, or from return air, is permissible.

The air passing over the humidifier must be warm enough to absorb the moisture. Therefore, a location after a heating coil is recommended.

The pan humidifier adds sensible heat to the air as well as moisture. The addition of heat by the pan humidifier must be considered whenever its use and location within the fan system are determined.

Steam Jet Humidifier. The main disadvantage of the steam jet humidifier is the liberation of odors from the boiler compound. For this reason steam jet humidifiers are more often used for industrial applications than for comfort installations.

Figure 23 illustrates space control of a modulating steam valve on a steam jet type humidifier. Because of the quick response of the humidifier, accurate control is possible. The addition of moisture is accomplished with only a slight increase in dry bulb temperature.

The modulating steam valve is interlocked with the fan to close when the fan is shut down. The humidity controller and the valve can be of the two-position type if desired. However, the fan interlock is still required. For successful operation the air passing through the humidifier must be warm enough to absorb the moisture.

Atomizing Spray Humidification. Air passing through the atomizing spray humidifier furnishes the heat necessary to vaporize and absorb the moisture. Therefore, a drop in dry bulb temperature results.

Control for Atomizing Water Spray. Because of the sensible cooling effect, it is necessary to provide sufficient heating capacity to maintain the required discharge temperature.

It is necessary to use two-position control in order to properly atomize the water. The fan motor interlock with the normally closed valve is also necessary.

Because of the two-position operation, it is not advisable to use the atomizing water spray humidifier where close control of space or discharge dry bulb temperature is necessary. Temperature control is made difficult by the change in heating load every time the water valve opens or closes. See Fig. 24.

Air Washer Humidifier. An air washer, when properly installed, is so close to being 100% efficient that for control purposes it is assumed that air leaving the washer is completely saturated.

The air washer is often selected as a humidifier because of the cooling effect of the process. The process is adiabatic as long as unheated, recirculated water is used. With air leaving the washer at dewpoint, it is necessary to provide reheat on a year around basis.

Dewpoint Control of Air Washer. Figure 25 illustrates dewpoint control of the air washer with the heat for the process furnished by a preheat coil. This system uses a modulating controller and a modulating valve.

As illustrated, the outside air damper opens and the recirculating pump operates whenever the fan is on. The room humidity controller operates as a high limit control and will stop the pump whenever the humidity goes above the controller set point. The use of the high limit would not be acceptable if continuous operation of the air washer is mandatory.

Without the limit control the system would go out of control whenever the wet bulb temperature of the outside air is above the set or established point of the dewpoint controller.

Control of the reheat coil can be from the space, from discharge, or from a combination of the two as required to fit the system design.

Modified Dewpoint Control. Figure 26 shows a complete air washer system as occasionally used in hospitals or similar installations requiring year around humidity control. This system illustrates how the various system components, previously discussed, can be combined into a single system.

The sequence of operating during the heating cycle is:

1. On fan start up, the outside air damper opens and the recirculating pump starts.
2. Preheat coil valve No. 1 gradually opens as outside temperature drop from 38 to 30 deg. The valve is open at temperatures below 30 deg and is closed at temperatures above 38 deg.
3. If the discharge temperature falls below 60 deg, the steam valve on preheat coil No. 2 gradually opens.
4. If the discharge temperature goes above 60 deg, the valve on the precooling water coil modulates toward the open position.
5. The reheat coil valves operate to maintain a constant temperature in their respective zones.

The conditions required for successful operations are that reheat must always be available, to prevent overcooling. It is also necessary that the volume of air delivered by the systems, and exhausted from the building, be large enough to handle the cooling load at the dewpoint controlled temperature.

Because of the problems involved with the use of a preheat coil, it is sometimes better to use a heat exchanger in the water line as shown in Fig. 27.

Air Washer Control with Reset. In this system, the desired leaving air dewpoint can be maintained as long as the outdoor air wet bulb temperature is lower than the wet bulb temperature at the desired dewpoint. The heat necessary to maintain the discharge temperature is added to the process by heating the washer water.

As illustrated, a room humidistat has been added to reset the dewpoint controller. This addition will compensate for internal losses or gains and correct for them. When a constant dewpoint is used, as in Fig. 25 and 26, the actual space humidity will vary as internal conditions change and, to some extent, as outside conditions change. The space humidistat can be added to the previous systems by changing the dewpoint controller to a submaster as used in Fig. 27.

In order to operate successfully, the mixed air temperature must be above 32 deg to prevent icing. If a low relative humidity is required to prevent condensation on cold surfaces, it may be necessary to provide for intermittent operation of the pump.

As illustrated, the recirculating pump will stop, the steam valve will close, and the outside air damper will close, whenever the fan is shut down. A pressure control is used to close the steam valve whenever there is a drop in water pressure.

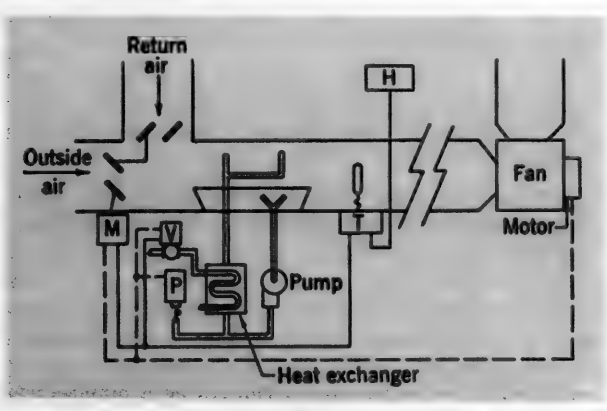


Fig. 27. Dewpoint control of air washer with reset from space humidity.

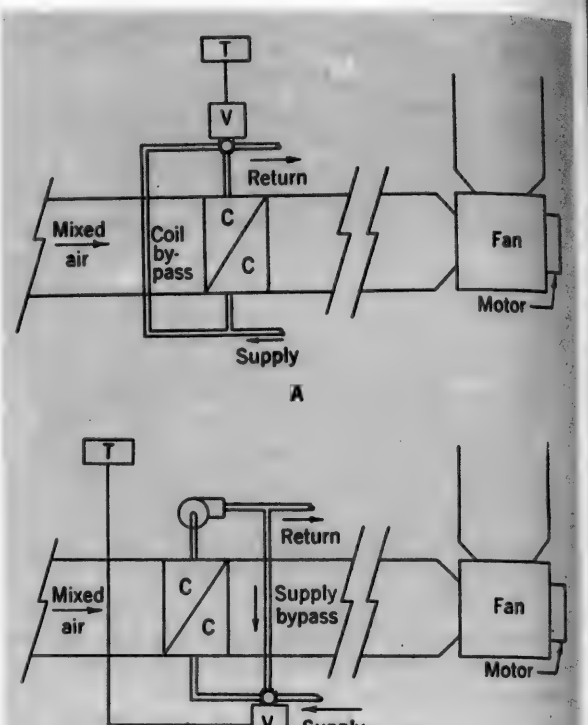


Fig. 28. Modulating control of water coils.

CONTROL OF WATER COILS

A water coil is another system component that can be used in combination with mixing dampers, face and bypass dampers, humidifiers or other components previously discussed.

A well designed water coil, when properly installed, greatly reduces the problem of a temperature gradient across the face of a coil.

The water heating coil, or the water cooling coil when used with a chiller, is normally piped with a three-way control valve.

Modulating Control of Water Coils. A three-way valve installation where supply water is by-passed around the coil is illustrated at *A* of Fig. 28. The amount of water passing through the supply and return is constant. The water through the coil is decreased on a drop in load.

The valve at the supply end of the coil is shown at *B*. The valve mixes water from the supply and returns water from the coil. The flow of water through the coil is constant. However, because of the mixing of supply and return water, the coil temperature changes as the valve modulates from one position to another.

Maintaining a constant volume through the coil is recommended on heating applications, especially when coil freeze-up is to be considered. The coil bypass arrangement is often used on cooling applications, as well as heating, when constant flow through the coil is not required. The coil bypass arrangement is less expensive as one pump can serve several coils.

Because of design and operating conditions, a three-way valve should always be installed with two inlets and

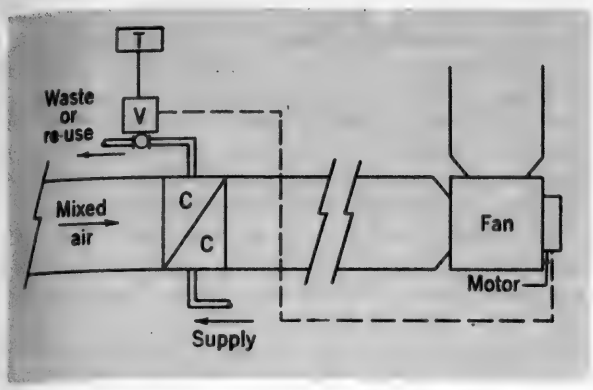


Fig. 29. Space control of cold water coil.

one outlet, as shown in Fig. 28, when used as a modulating valve.

Face and bypass dampers can be used in combination with either piping arrangement illustrated in Fig. 28.

Control for Cold Water Coil. Figure 29 illustrates a cold water coil controlled by a space thermostat. The valve and thermostat can be selected for either two-position or modulating service. The selection of a two-position control may be required because of a re-use application for the waste water or for special control conditions.

The use of modulating control will save some water at light loads as the water will be in the coil longer and will absorb more heat from the air before going to waste. However, this will increase the average temperature of the coil and less latent heat or moisture will be removed from the air.

DIRECT EXPANSION COOLING COIL CONTROL

Manufacturers of refrigeration compressors and their accessories provide various means of controlling the compressor at full or part load conditions. The manufacturers also provide safety devices and interlocks to insure safe operating conditions and the manufacturers' instructions should be followed. Therefore, in keeping with the title, this discussion is limited to the direct expansion coil as installed in a fan system.

The problem in controlling a direct expansion cooling system is that of balancing the control of latent heat removal against the control of dry bulb temperature.

By lowering the coil temperature, greater dehumidification (latent heat removal) can be obtained. However, it is not economical to operate the coil at the lowest possible temperature at all times.

Valve Control of DX Coil. Figure 30 illustrates solenoid valve control of a direct expansion coil. The two-position operation of this system is undesirable because of the alternate warm and cold blasts produced.

Face and Bypass Control of DX Coil. In order to obtain modulating control of the discharge temperature, face and bypass dampers are often installed as shown in Fig. 31. As illustrated, the space thermostat modulates the face and bypass dampers. The liquid line solenoid will operate in a two-position manner at predetermined damper positions.

Both valve control and face and bypass damper control of the cooling coil provide dehumidification. However, the physical conditions involved prevent maintaining a definite temperature and limiting humidity under all load conditions unless reheat is provided.

Control with Reheat. Figure 32 illustrates an easy way of providing high limit humidity control. The room thermostat can call for either heating or cooling. Under sensible cooling load or heating conditions, when the humidity rises to the high limit set point, the humidistat calls for full cooling. The thermostat operates the modulating heating coil valve to prevent over-cooling of the space.

YEAR-ROUND AIR CONDITIONING SYSTEMS

By combining fan system components and their controls, as previously discussed, the year-round fan system can be developed.

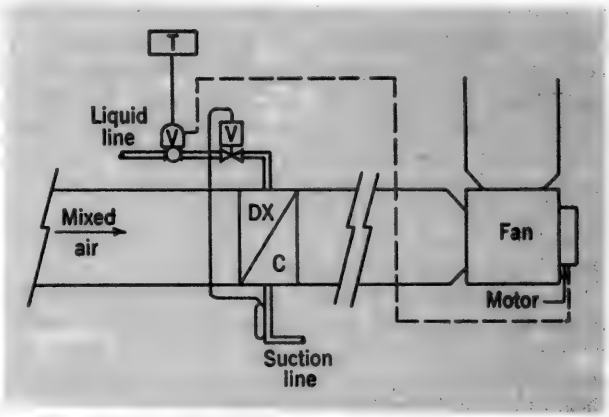


Fig. 30. Valve control of direct expansion coil.

Year-round Control. Manual control of fresh air and return air dampers with a safety low limit controller in the mixed air has been discussed previously, Fig. 19. However, in order to provide an economical year-around system, it is desirable to add two outside controls as shown in Fig. 33. As shown here, the outside air and exhaust air damper are at the minimum position in cold weather. As the outside air temperature rises to a point where additional outside air can safely be used for cool-

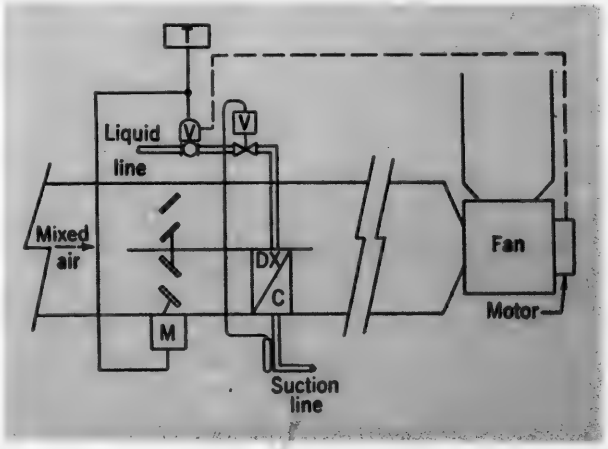


Fig. 31. Face and bypass control of direct expansion coil.

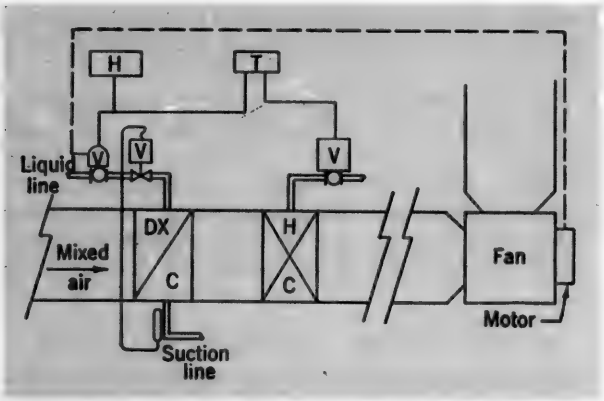


Fig. 32. Temperature and humidity control with reheat.

ing, one of the controllers modulates the dampers to provide the additional outside air. On a continued rise in outside air temperature, the outside air does not cool the space but adds to the cooling load. Therefore, the second outside controller returns the dampers to the minimum position in order to keep the cooling load at a minimum.

To provide both heating and cooling, a heating coil is added to the cooling system shown in Fig. 31. The combination is, again, illustrated in Fig. 33.

The operation of this portion of the system is under control of the room thermostat. During the heating season, the heating valve modulates to supply the necessary heat to the space. The face damper is open to the heating coil and the bypass is closed.

On a call for cooling, the refrigerant solenoid valve opens and the face and bypass dampers modulate to supply the necessary cold air to the space.

In order to prevent operation of the heating valve under control of the low limit discharge control, an outside control is added to switch the low limit out of the control circuit during the summer cycle.

Interlocks with the fan motor are provided as follows:

1. Turning on the fan energizes the control system.
2. Turning off the fan closes the refrigerant solenoid, the outside air damper and the exhaust air damper.

Successful and economic operating of this system depends on selecting, and obtaining, the proper settings for several controllers. Because of changing load conditions, it is impractical to attempt to provide full economy of outside air control from outside temperature alone. A change in sun load or occupancy will require more or less outside air for atmospheric cooling than the previous condition at the same outdoor air temperature.

Electronic Control Without Compensation. Figure 34 illustrates electronic control of the same year-round system just discussed. Signals from the space and discharge thermostats are coordinated by the electronic panel so heating or cooling can be supplied. The heating valve is modulated to supply heat, or the cooling valve is opened and the face and bypass dampers modulated to supply cooling. Outdoor air for cooling is supplied by modulating the ventilation equipment. The one outdoor control is used to return the dampers to the minimum position when the outdoor air is too warm to provide cooling.

By using the electronic panel to coordinate the signals and provide the complete sequence of heating, atmospheric cooling and mechanical cooling, the system takes full advantage of outdoor temperatures.

The system illustrated in Fig. 34 is shown to compare the use of electronic controls to the electric or pneumatic controls used in Fig. 33.

Electronic Control with Compensation. By adding two additional outdoor controls as shown in Fig. 35 it is possible to:

1. Correct for offset, or droop.
2. Raise the space temperature, during the winter cycle, as outside temperatures fall.
3. Raise the space temperature, during the summer cycle, as outside temperatures rise.
4. Provide automatic change over from winter compensation to summer compensation.

Offset is a condition that always exists in a control system because of the throttling range of the controller. Compensation from outside temperatures is one way of correcting for this condition.

It has been established that a constant space temperature does not always provide the same level of comfort as outdoor conditions change. The compensation and

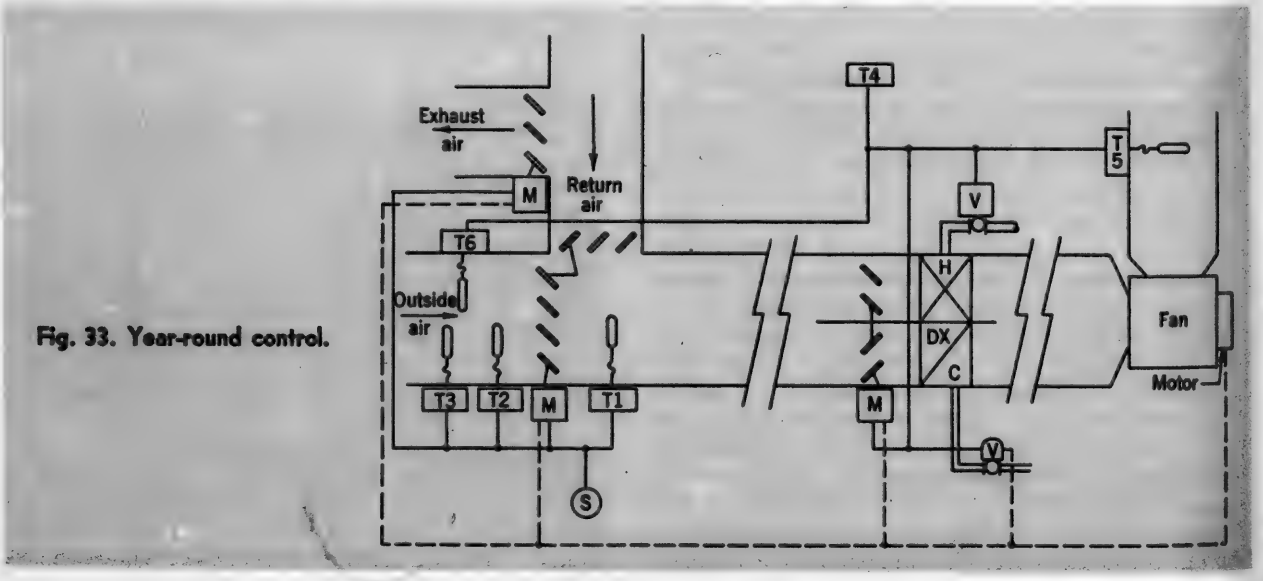


Fig. 33. Year-round control.

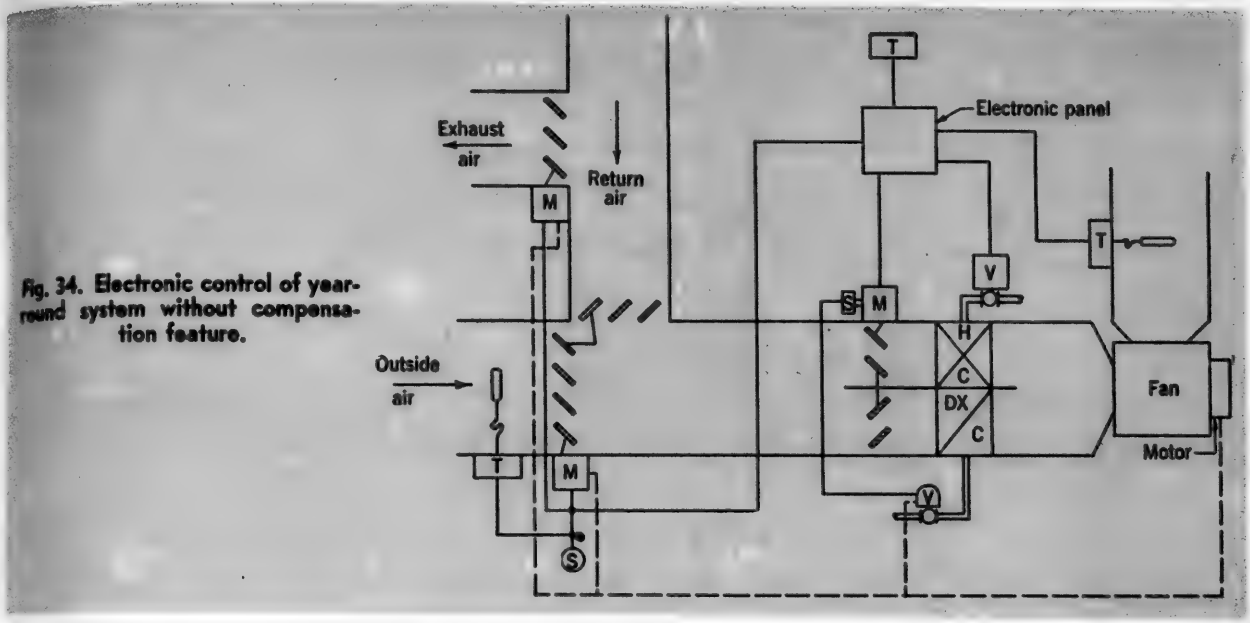


Fig. 34. Electronic control of year-round system without compensation feature.

changeover controls used in conjunction with the electronic control panel make it possible to select a year-round reset schedule that will provide the same high comfort level for all outside conditions.

CENTRALIZED SUPERVISION AND CONTROL

During the past few years the use of fan systems for heating, ventilating and air conditioning in all types of commercial buildings has been increasing. The fan system has become more intricate and designed to do a more efficient and more complete job.

During this time, in order to insure that all equipment is operating at an optimum, providing the best efficiency and comfort, it has been necessary for the operating engineer to establish inspection and check procedures. To facilitate the inspection, the design engineer has been grouping gages and thermometers on a panel in the fan room. The operator could then check the system temperatures and approximate equipment operation by studying the panels in each and every fan room installed in the building.

Recent developments in automatic control have made it possible to design control systems with one central panel for an entire building. The central panel makes it possible to collect key operating data on air conditioning, heating, refrigeration and ventilation systems and to provide remote control of the equipment from a central point.

The master panel can be considered as an additional element in the fan system. It is the element that, graphically, ties together the other components that make up the complete fan system.

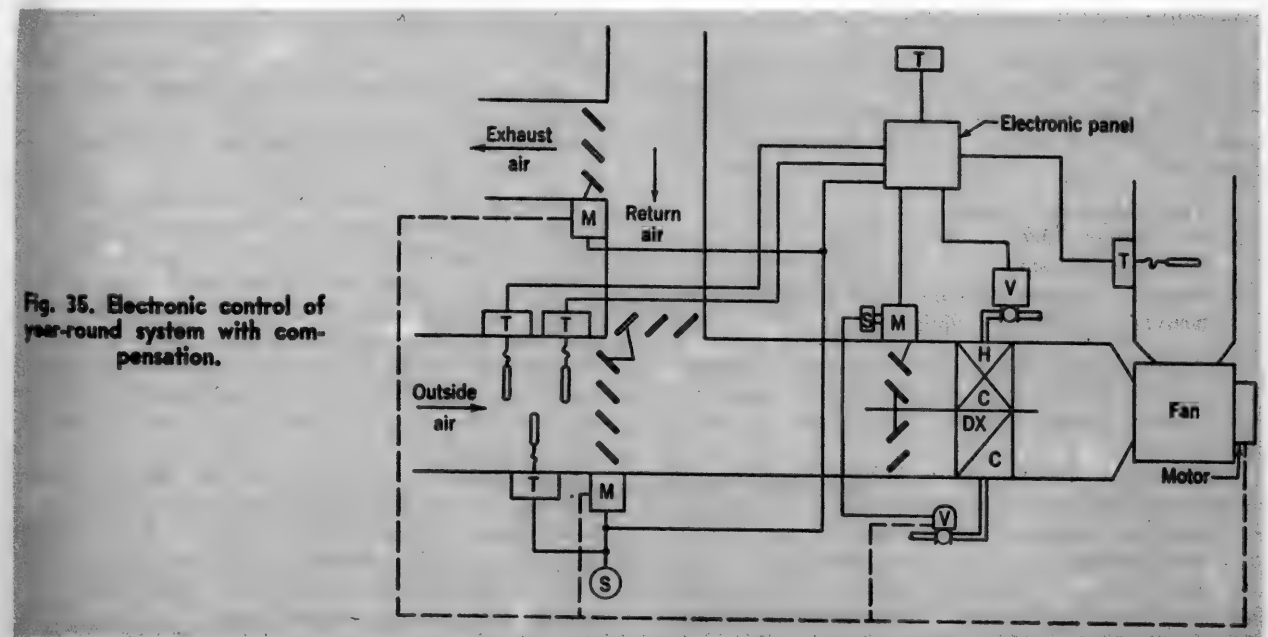


Fig. 35. Electronic control of year-round system with compensation.

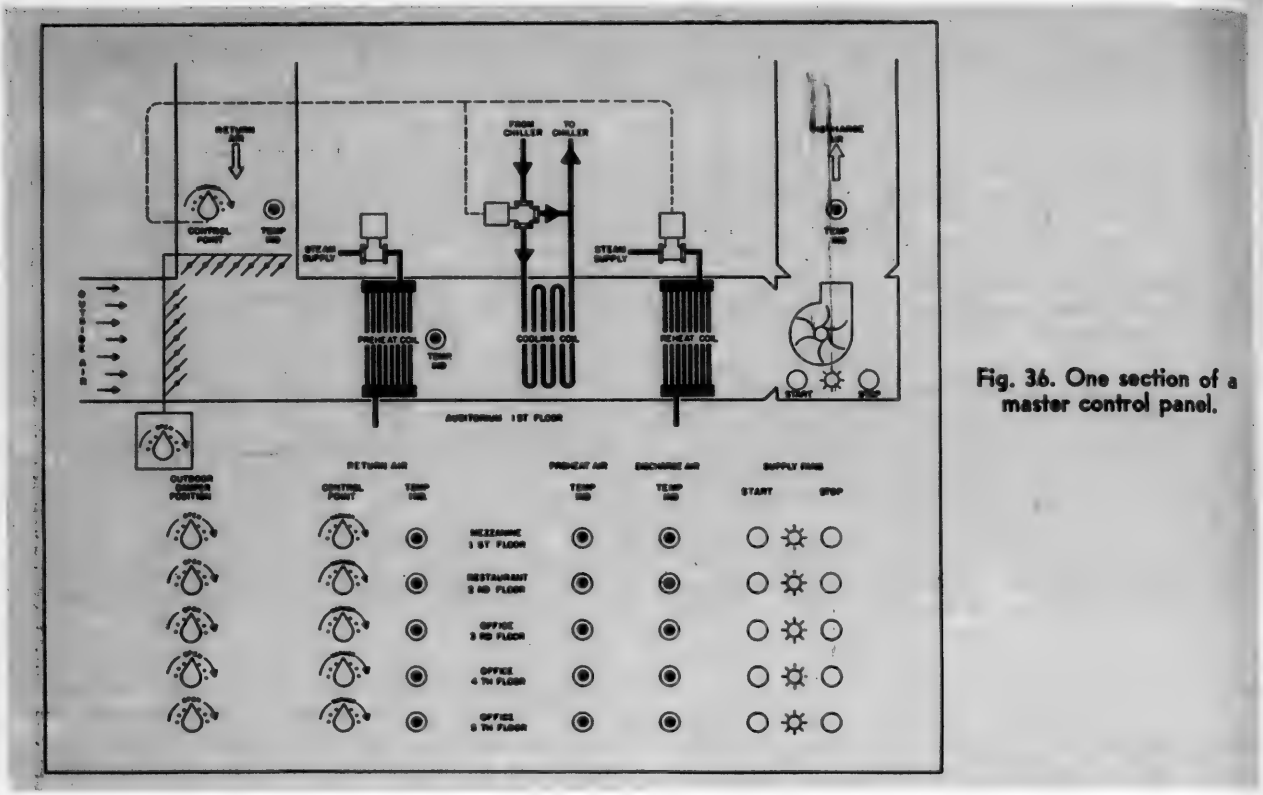


Fig. 36. One section of a master control panel.

Figure 36 illustrates, graphically, a fan system that is typical of six individual systems in one building. The control knobs and indicating switches for all other systems are arranged below the diagram. By pressing the button indicated, the operator can:

1. Stop or start any of the six fans.
2. Check return air temperature, preheat air temperature, discharge air temperature on all six fan systems.
3. Adjust ratio of outside air to return air on any of the systems.
4. Adjust control point of return air controller.

Only a single section of a master panel is shown in Fig. 36. Other sections of the panel would include a multi-point temperature indicator on which all temperatures are read, as well as graphic representation and control of:

1. The refrigeration system.
2. The heating plant.
3. The exhaust system.
4. Any other element of the building's air conditioning, heating, or ventilating equipment.

By following a possible sequence of events at a master panel in a typical five story office building it can be seen how possible troubles can be located and correction facilitated.

At the start of the day, the building engineer goes to the section of the control board that depicts the primary air system in miniature. To ventilate the building, he starts the exhaust and supply fans, which are on the roof of the building. He also starts the six zone supply fans, which are on each floor. He presses a button and reads the outside air temperature, feels that cooling will be required during the day.

Simplified Operation

He switches the system to summer operation and starts the circulating pumps to the room units, which are controlled by individual room thermostats. Then he starts the condenser water pump, cooling tower fan, and the chilled water pump. Once all three of these have started, the compressor starts automatically.

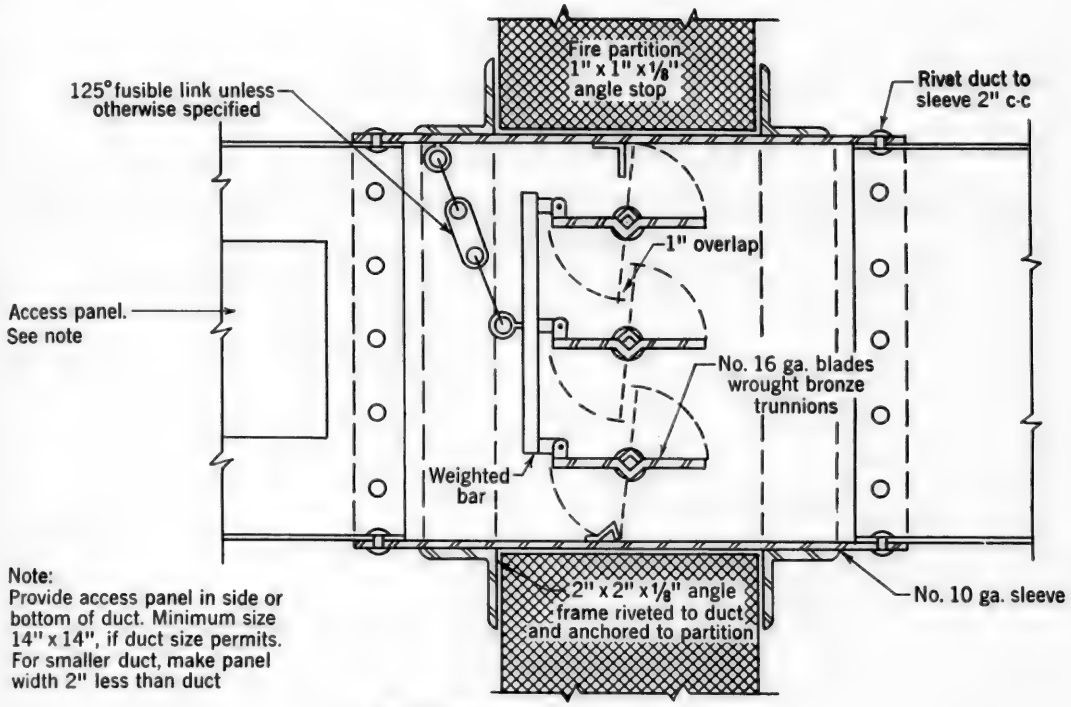
Without a control center, this starting of equipment may require coming in two hours earlier and traveling through the building to start the various pieces of equipment. The shorter running time of fans and pumps results in savings in electrical power and steam, and longer equipment life.

After attending to other duties for 10 or 15 minutes, the engineer returns and checks the chilled water temperature as shown on his chilled water temperature controller. If he finds the water temperature is not satisfactory he can adjust it by turning a knob.

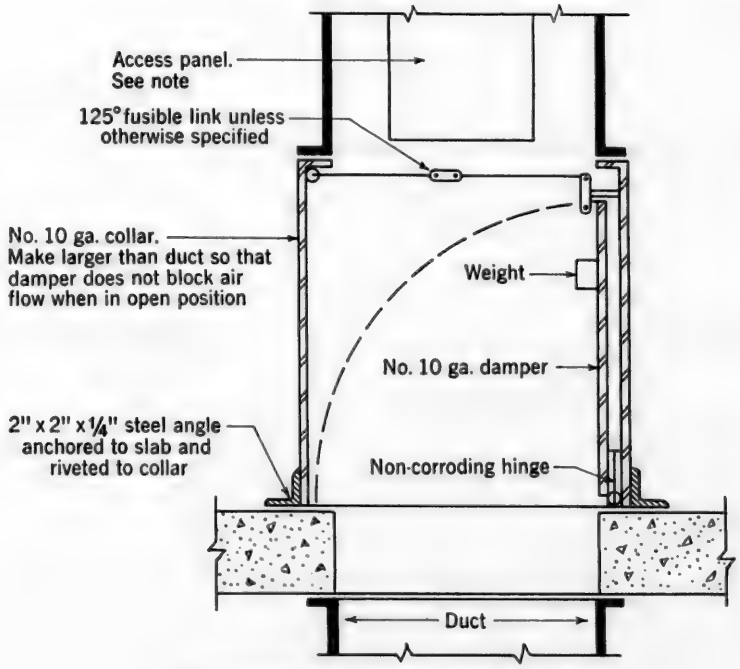
By 8:30 a.m. he is ready to take his first log of temperature throughout the building. If nothing unusual is noted, his only duty as far as the air conditioning system is concerned is to log temperatures hourly the remainder of the day. Should he get a call that a zone is too hot or too cold, he can make the necessary operating changes from this panel.

Each element of the fan system, as used in a large building, has been discussed as a unit and integrated into the fan system. Because of the large number of specific requirements, the innumerable combinations and arrangements of the elements discussed, it is impossible to present all of the control systems in use.

DETAILS OF FIRE DAMPERS


Fire partition
1" x 1" x 1/8" angle stop
125° fusible link unless otherwise specified
Rivet duct to sleeve 2" c-c
1" overlap
Access panel. See note
No. 16 ga. blades wrought bronze trunnions
Weighted bar
2" x 2" x 1/8" angle frame riveted to duct and anchored to partition
No. 10 ga. sleeve
Note:
Provide access panel in side or bottom of duct. Minimum size 14" x 14", if duct size permits. For smaller duct, make panel width 2" less than duct

MULTI-LOUVERED FIRE DAMPER


Access panel. See note
125° fusible link unless otherwise specified
No. 10 ga. collar. Make larger than duct so that damper does not block air flow when in open position
Weight
No. 10 ga. damper
2" x 2" x 1/4" steel angle anchored to slab and riveted to collar
Non-corroding hinge
Duct

HINGED FIRE DAMPER AT FLOOR SLAB

ACCESS PANELS IN SHEET METAL DUCTS

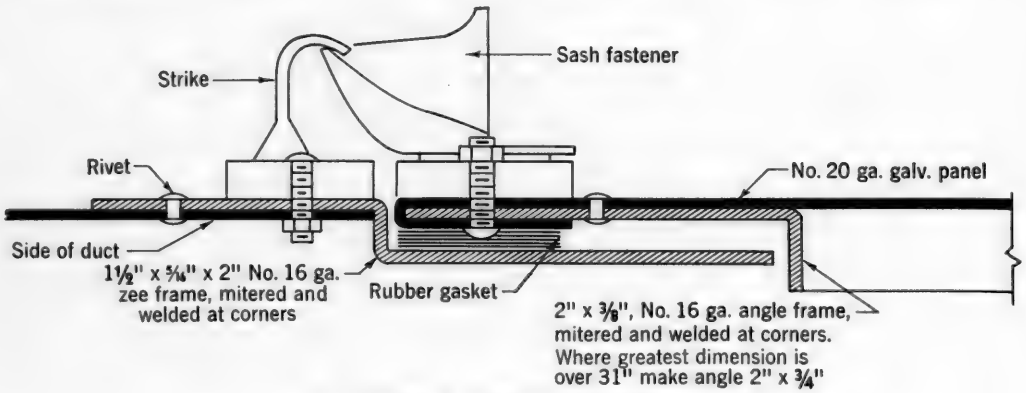

Strike
Sash fastener
Rivet
No. 20 ga. galv. panel
Side of duct
1½" x ⅝" x 2" No. 16 ga. zee frame, mitered and welded at corners
Rubber gasket
2" x ⅜", No. 16 ga. angle frame, mitered and welded at corners. Where greatest dimension is over 31" make angle 2" x ¾"

Fig. 1. PANEL IN UNINSULATED DUCT

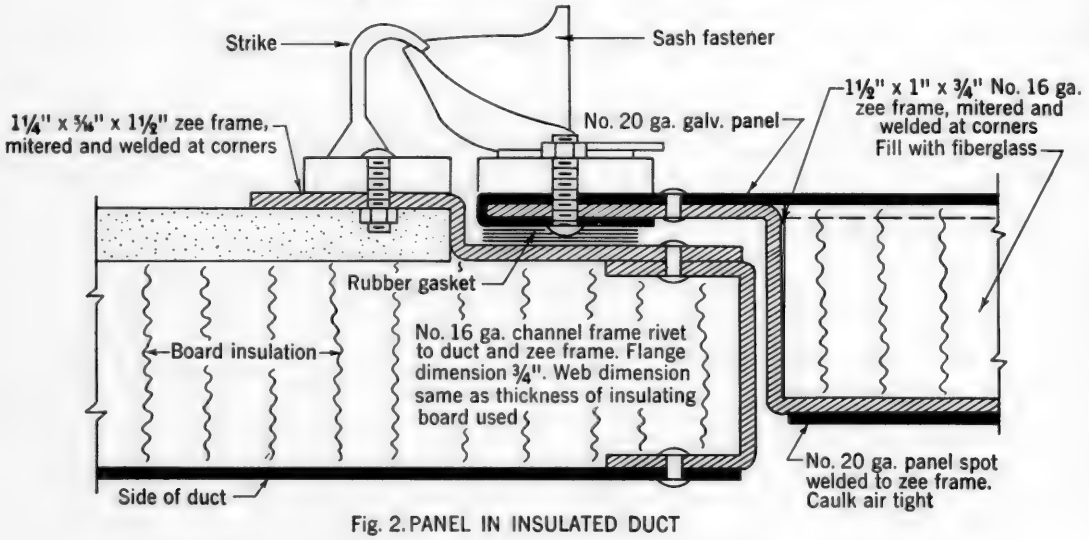

Strike
Sash fastener
1¼" x ⅝" x 1½" zee frame, mitered and welded at corners
No. 20 ga. galv. panel
1½" x 1" x ¾" No. 16 ga. zee frame, mitered and welded at corners
Fill with fiberglass
Rubber gasket
Board insulation
No. 16 ga. channel frame rivet to duct and zee frame. Flange dimension ¾". Web dimension same as thickness of insulating board used
No. 20 ga. panel spot welded to zee frame. Caulk air tight
Side of duct

Fig. 2. PANEL IN INSULATED DUCT

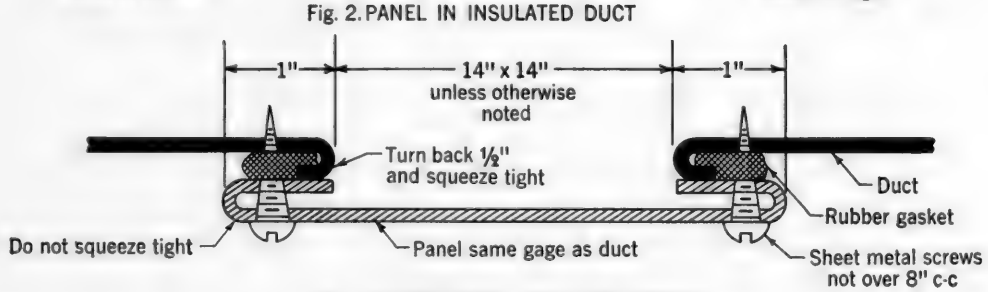


Fig. 3. ACCESS PANEL FOR FIRE DAMPER
Use in uninsulated duct of 5 sq ft or less cross sectional area. For all insulated ducts use Fig. 2. For uninsulated ducts over 5 sq ft in cross sectional area, use Fig. 1. All drawings show sections through panel frames

Drawings on This and Reverse Page,
Courtesy of Lazenby & Borum, Consulting Engineers, Atlanta, Ga.

Gas Engine Heat Rejection to Evaporative Condenser

F. W. ADAMS
Engineer, United Gas Corporation, Monroe, La.

A piping hookup is suggested which will permit the use of an evaporative condenser to dissipate part of the heat from an engine connected to drive a compressor.

WHEN a gas engine is used to drive a compressor (as with a Ready Power Gas Engine Compressor Unit) it is necessary to dissipate part of the engine's heat resulting from combustion in some manner. When the engine is used with an atmospheric type cooling tower, the cooling tower is over-sized approximately ⅓ of the refrigeration tonnage to allow for engine cooling. However, when this engine is used with an evaporative condenser, the piping arrangement shown in the sketch will allow the use of an evaporative condenser of capacity equal to the refrigeration tonnage, that is, a 30-ton refrigeration compressor will require only a 30-ton evaporative condenser.

Separate Motors Required

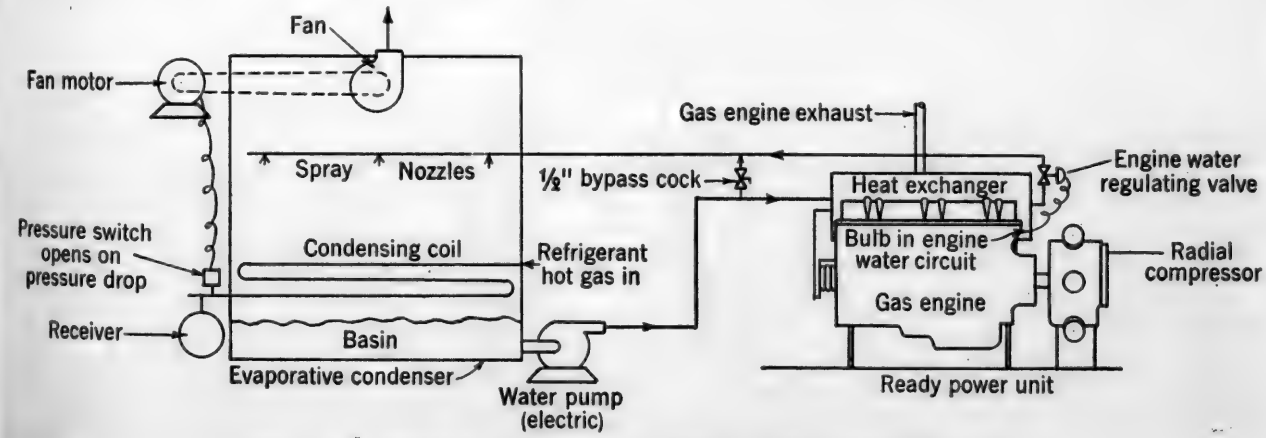
The evaporative condenser must have a water pump and fan driven by separate motors. The water pump circulates water from the evaporative condenser basin, through the engine heat exchanger, through the engine water regulating valve, and through the spray nozzles of the evaporative condenser. Water from the spray nozzles condenses the hot refrigerant gas and collects in the basin as shown. Cooling of the water spray takes place before the water reaches the refrigerant condensing coils, thus giving no appreciable increase in head pressure.

A small bypass line is required which allows a small amount of water to flow to the nozzles at all times. This is necessary because on the initial start-up with a cold engine, the engine water regulating valve is throttled to a closed position and allows no water to pass until the engine has warmed up sufficiently to require cooling. The small amount of water that is bypassed is sufficient to keep the head pressure below the cut-off point of the pressure limit control.

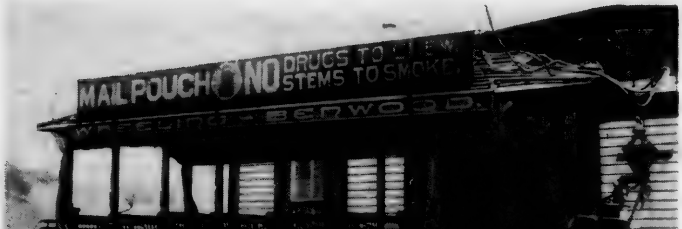
One feature of the engine water regulating valve is that it will throttle the flow of water through the engine heat exchanger when the power unit operates at reduced capacity, at which time the evaporative condenser would tend to become over-sized, except that the reduced flow of water helps to reduce its capacity somewhat. An engine's heat rejection is almost directly proportional to the amount of work it is performing and if the engine throttles down to reduce refrigeration capacity, the heat rejection through the heat exchanger then of necessity is also reduced.

Added Control May Be Required

If this reduction of water flow is not sufficient to reduce the evaporative condensing capacity, another control refinement is to use a pressure switch in the high side of the system that opens on a pressure rise so as to stop the cooling tower fan. This effectively further reduces the evaporative condenser capacity. Reduction of the evaporative condenser's capacity in this manner is necessary in order to keep the condensing head pressure high, so that the expansion valves will be permitted to operate properly. If the condensing pressure were allowed to drop as the evaporative condenser became over-sized for the load being imposed on it, then the expansion valves would not perform properly.

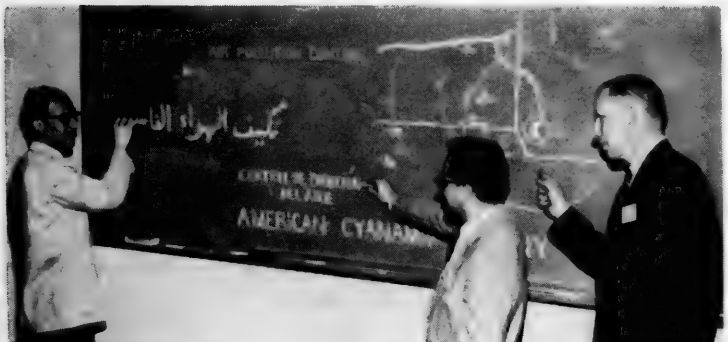


Piping connections for gas engine heat rejection to evaporative condenser.



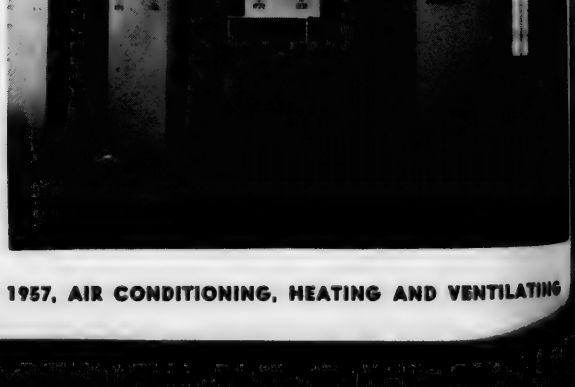
AIR-CONDITIONED TROLLEY. (Above) Although some trolley cars have been air cooled for some time now, the Silver Sightseer (at right), streamlined street car of the Washington, D. C. Transit Company, is truly air conditioned with four 2-ton units. George S. Jones, managing director of Air Conditioning and Refrigeration Institute, is shown boarding the air-conditioned car. "For some time," Mr. Jones said, "we at ARI have predicted that air conditioning of mass transit vehicles can help provide the solution to downtown congestion in our cities, and perhaps offer some aid to downtown business districts now suffering from the flight to the suburbs of their customers and the establishment of giant suburban shopping centers."

Picture



UNITED NATIONS. Air pollution control spoke an international language when students of the Graduate School of Public Health at the University of Pittsburgh visited nearby chemical plant to study industrial hygiene processes. Dr. Mostafa El Batawi of Egypt (left) shows how to write "air pollution control" in Arabic to fellow student, Pedro P. Olortegui, a Peruvian chemical engineer who had just "said it in Spanish." Serving as guest teacher is W. R. Bradley, right, chief industrial hygienist for American Cyanamid Co., Bridgeville, Pa.

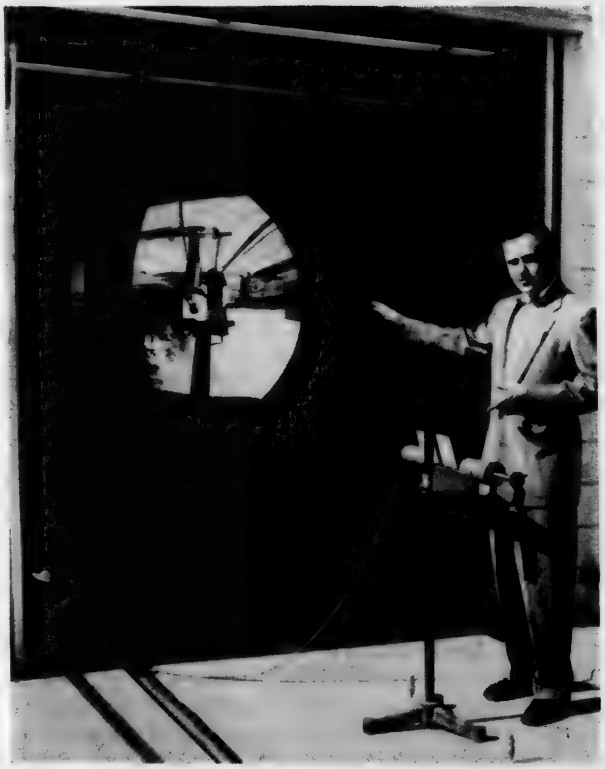
WHOLESALE SUPPLY HOUSE FEATURES TECHNICAL LIBRARY. Thermal Supply, Houston, Texas, wholesaler of air conditioning and heating equipment, in addition to fulfilling a primary function as a source of equipment and supplies, also serves as a channel of information from the manufacturer to the contractor and dealer. A technical library has been set up in a separate room, adjoining the spacious sales display floor, illustrated at lower left. An experienced librarian spends full time cataloging and replacing material in the library. Among material available for either reference or loan are manufacturers' sales literature and specification sheets as well as engineering handbooks and instruction manuals. Another department of the technical library which has proved popular is the back copy file of trade journals. These journals are kept sorted and readily available in individual binders in a special section of library, shown at lower right.



STUDENTS SEE SCIENCE IN ACTION. Nearly 6000 high school students and their teachers visited the laboratories of the National Bureau of Standards during the Bureau's recent Guest Week. Through lectures, exhibits, and demonstrations, students were given a general introduction to the world of science and the activities of a large research establishment. Photos at right illustrate a small part of the lecture-demonstrations students received.

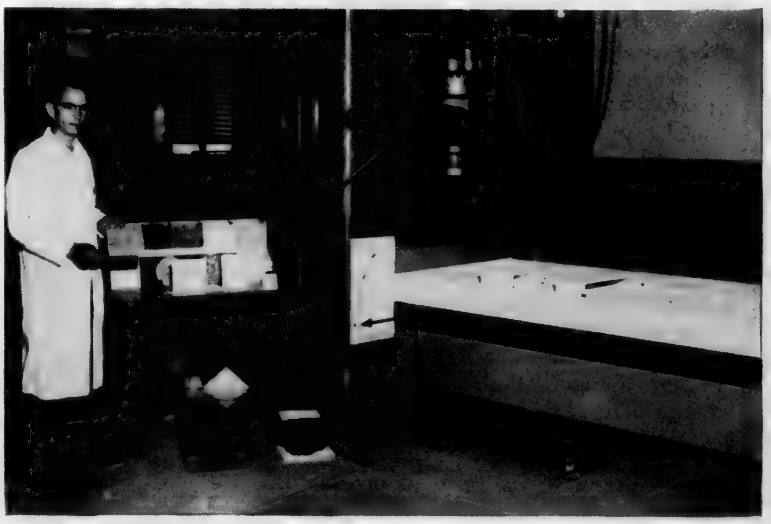
(Top) High-level radiation room in the gamma ray laboratory of NBS where scientist describes methods of handling, detecting, measuring, and using radioactive materials. Principal types of radiation detectors are exhibited on table at right. Under the floor, at left, are three large cobalt-60 sources well shielded by lead. Cylindrical covers, visible in mirror on floor, over the sources can be opened by remote control to permit radiation upwards. Instruments such as one shown suspended over the sources can then be calibrated in accordance with known strengths of cobalt-60 sources.

Paragraphs



(Center) View of the solar energy furnace at National Bureau of Standards. The circular parabolic reflector in the background concentrates the sun's rays onto an area 1/4 inch in diameter, and thus generates temperatures up to 4000 deg C (7000 deg F), nearly two-thirds the temperature of the sun's surface. Light from the sun is reflected into the parabolic mirror from a large, rectangular flat mirror which can be seen, much reduced in size, reflected in the parabolic mirror. The apparatus just in front of the scientist is an electronic monitor which guides the flat mirror so that it accurately follows the sun and reflects the sun's rays along the optical axis of the parabolic mirror.

(Bottom) Recent advances in building technology at NBS are explained to visiting high school students. At left, the scientist is demonstrating some of the properties of new, lightweight concretes, one block of which is seen floating in water below the table. At right, scientist demonstrated the flexibility and strength of recently developed thin-shelled concrete, a pre-stressed, reinforced material for prefabricated structures. Also under study is the fire resistance of building elements. To meet this problem, the Bureau developed a transient heat-flow analyzer of electrical type which makes use of thermal properties of materials in order to predict the heat flow through various building elements.



Airview of the Sterling Township Plant, Ford Motor Company, Chassis Parts Division.

Problems in Designing Facilities for an Industrial Plant

HOWARD H. KRONICK

Engineer, Albert Kahn Associated Architects & Engineers, Detroit, Mich.*

Several basic problems encountered by the mechanical engineer in designing facilities for automation were presented in the development of an industrial plant for the production of automobile chassis parts. This article treats the engineer's approach to these problems and their solution such as those concerned chiefly with ventilation of a machining plant, heat treat area ventilation, water cooling for process equipment, coordination of trades, and zoning system.

THE Chassis Parts Division of the Ford Motor Company recently placed in operation new and completely integrated manufacturing facilities erected on a 150-acre site in Sterling Township, Michigan, a small community north of Metropolitan Detroit. The main manufacturing building of this highly functional new facility is devoted to production of automobile differential and rear axle assemblies; ball joint suspension assemblies; drive shafts and related parts. The administration area of the plant houses the headquarters offices of Ford's Chassis Parts Division.

General Description

The new Sterling plant was designed by Albert Kahn Associated Architects and Engineers in close collaboration with Ford's Plant Engineering Office, J. A. MacAlarney, director. It provides approximately 1,800,000 sq ft of floor space and consists of: A two-story administration building, flanked both on the north and south by employee services and facilities, such as an employment office, hospital, cafeteria and locker rooms; a main manufacturing building, containing about 1,400,000 sq ft of floor space; a boiler house; salvage building; incinerator building; sanitary sewage and industrial waste treatment plants, and other outlying facilities, including elevated and ground suction water storage tanks, and parking lots to accommodate 5,000 cars.

The plant is of steel frame construction. Exterior walls of the manufacturing building consist of precast concrete panels to sill height with aluminum sash and siding above. The administration building is faced with brick, porcelain metal panels and aluminum sash. The roof is composition built-up pitch and slag on insulated metal decking.

Ventilation of Machining Plant

Provision for employee comfort was a major consideration in the design of this latest and most modern addition to Ford's manufacturing facilities. Achieving comfort conditions was complicated by numerous problems arising from the increased use of automatic machinery. One of these problems was the dissipation of appreciably larger heat gains common with this method of manufacture as opposed to methods formerly prevalent in the industry.

Soaring heat loads result primarily from the greatly increased use of electric power. The effect is an operating load of 25 watts or 85 Btu per square foot of floor area. Another source of added heat is the increased use of steam heated washers occasioned, in part, by the neces-

* Since writing this article, Mr. Kronick has left this office to start his own consulting service.

View of the Machining Building, with air plenum installed around columns.

sity to keep conveyors (used extensively throughout the plant) in clean and operable condition.

The generally accepted method of maintaining comfort during the summer months has been to introduce cooler outside air into the building through various types of air make-up units and to discharge this air inside the building at the truss level at a sufficient velocity to reach the working area below. The hot air, which is displaced by this cooler air, is then exhausted at the roof level through powered exhausters.

The problem in driving this air down to the workers' level, is the tendency to aspirate the hot air from the upper zone of the building into the 12 ft zone above the floor, with part of the air curling off into the truss space to short circuit to the roof exhausters. The result is that very little effective cooling is accomplished in the lower zone.

A solution was possible, if cooler outside air could be introduced directly into the 12 ft zone above the floor, by extending ducts through this strata of hot air. The curtain of cooler air would then force the heated air up into the truss space and thence through the roof exhausters to the outdoors, resulting in a highly efficient cycle of air cooling.

The problem encountered was to find a method of invading the production space below the truss level without the air ducts interfering with plant operations. Working closely with Ford Motor Company engineers, a compact method of wrapping an octagonal sheet metal air plenum around a building column was developed. Through this plenum, air is discharged horizontally at a level of 9 ft above the floor.

A new style vertical outlet discharges the air into the zones below 9 ft without excessive residual velocity at the breathing line. This outlet was developed to satisfy the requirements dictated by the architect-engineer's basic system through co-operation between the owner, the outlet manufacturer, and the consulting engineers. The outlet is mainly an efficient slot orifice placed in a cylinder which allows the orifice to be rotated horizontally through a 60 deg angle. In addition, the outlet includes adjustable vanes which may be used to change the direction of air flow.

The air plenum was kept to a maximum overall dimension of 42 in. by 42 in. to stay within the limits imposed by the company's plant engineering department. Outlets were placed on six sides of the octagon to form a complete peripheral coverage. The combination of placement and adjustability forms a system which covers the area completely.

The basic ventilating unit consists of: A blackout roof intake hood with automatic close off dampers; a stock 20,000 cfm horizontal blower unit ventilator suspended in the truss space; extended ducts to the air plenum; the air plenum around the column, and the vertically placed discharge outlets.

By the addition of a coil section, face and bypass dampers, steam and condensate piping and a temperature control system to the basic unit, the necessary means to temper air through a percentage of the air supply units was obtained. With these winter supply units, provision was made for comfort ventilation during the winter, as well as the replacement of air lost through process exhaust.

It is interesting to note that the quantity of process exhaust has been steadily increasing over the years to the point where some manufacturing plants have been operating with internal negative air pressures. During the winter season, this leads to objectionable cold drafts in areas near the building's perimeter and especially at frequently used exterior doors. This condition in a building can be greatly alleviated by achieving a positive pressure, however slight it may be.

Assuming that the exhaust requirements in this plant should ever increase to the point where they would exceed the amount of air now supplied in the winter, additional summer units can easily be converted to winter units as outlined.

Ventilation of Heat Treat Areas

An interesting solution was developed to problems in the two heat treat areas—the Front Suspension Heat Treat and the Carrier Heat Treat. Naturally, the heat released by the furnaces and quench tanks presented a major obstacle to achieving comfort conditions for the equipment operators. No attempt was made to provide complete area cooling in these areas. Fresh air units located on platforms above the roof, discharge cool air along the perimeter of the heat treat areas. Part of this air is used for air make-up for furnaces and part is used to replace air exhausted at the roof through a continuous non-powered roof exhauster extending the entire length of each area.

Individual spot cooling for the operators is achieved by use of a device called a "man cooling outlet," designed in the Kahn offices and used very successfully on previous projects. These outlets are supplied by an underfloor duct system and are mounted on the floor. The operator has the option of adjusting this outlet to either discharge the air directly on himself, or to spill the air downward to the floor. In each case the same amount of cooler air is supplied to the area. A further adjustment permits the outlet to be rotated in 15 deg increments around the full 360 deg circle. The combination of adjustments possible gives the operator full latitude of individual cooling.

Cooling Water System

A central cooling water system is installed in this plant to serve as a source of cooling for welding equipment, machining equipment, furnace heat exchangers, tube mills and many other pieces of machinery requiring heat removal.

The cooling tower and pump house are located approximately 300 ft from the factory building toward the boiler house, since a section of this tower also serves to cool the compressed air and the air compressors.

This system is an indirect, closed circuit, circulating water system. By indirect, we mean that the water circulated through the induced draft cooling tower passes over several banks of coils while cascading down through baffles to the well below.

The tower water is cooled to 82.5 deg through this process and then indirectly cools the process water circulated through the tubes from 100 deg to 90 deg. The cooling water then circulates through the factory to serve the various pieces of equipment.

This system guarantees that relatively clean, mineral-free water is recirculated through the piping system with a minimum amount of entrained air, thereby lengthening the life of the piping and the equipment served.

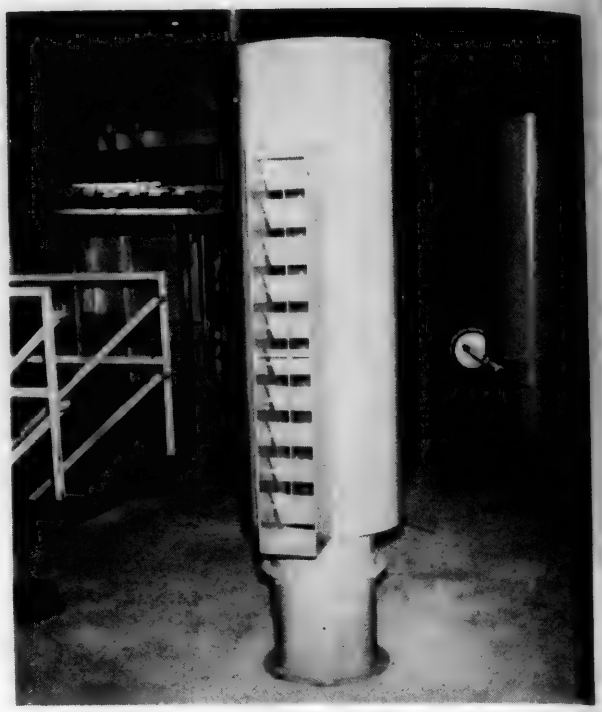
The tower water system operates as follows:

Vertical turbine pumps based at the floor level of the pump house continually circulate water at the rate of 6000 gpm. The water circuit runs underground to the tower located at grade level, thence up to the flume type distributing system, down over the indirect cooling coils to the dry well, and then by gravity back to the storage reservoir located below the pump room floor. This type of system insures against freeze-up in the tower well whenever shut down during the winter months.

The cooling water is separated into two systems: (1) the air compressor cooling water system, and (2) the process cooling water system. System No. 1, the air compressor system, circulates 1100 gpm through one group of cooling tower coils in parallel and then to the boiler house. After serving the compressors and aftercoolers, the water is returned to the pump house. System No. 2, for the process water, incorporates the remainder of the indirect coils and circulates 3500 gpm through a reversed return system of piping and back to the pump house.

A constant static head is maintained on all parts of the system by use of a vertical expansion tank located well above the highest piping in a crane bay section of the plant. This system has automatic temperature control features which maintain an even temperature of the supply water by bypassing a portion of the water around the cooling tower. The water temperature is never allowed to drop below 80 deg, as lower temperatures would have an adverse effect on certain equipment using the water.

When the system is shut down overnight or on weekends, a jockey pump and steam water heater go into service to prevent freezing of the water in the indirect coils of the cooling tower and the cooling water piping above ground. About 150 gpm of heated water are circulated through these coils and back to the pump house to maintain a water temperature of 50 deg thus eliminating the need to drain the cooling tower. That section of the process water system is isolated from the factory by means of automatic control valves.



Adjustable man-cooling outlets in heat treat areas of Machining Building.

The balancing of this system was accomplished by carefully sizing the piping to provide a 40 psi differential pressure at all equipment locations. Ordinarily, if equipment pressure losses are known, this means of balancing is sufficient to distribute the correct proportion of water to each location. However, because necessary information as to pressure losses through equipment was not available to the owner at the time the building was designed, a throttling valve and supply and return pressure gages were installed at each pair of branches as a means of adjusting to the 40 psi pressure differential.

Coordination of Trades

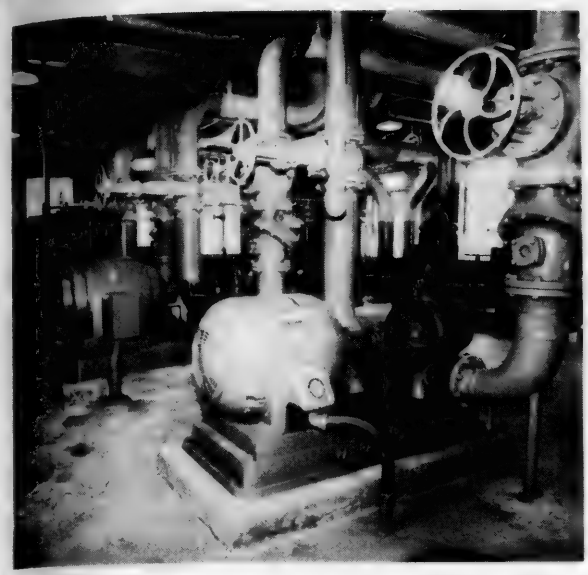
To serve as a medium for coordination, a master plan of the factory was drawn at the outset of the project, indicating the air plenum at the columns as well as all plumbing, fire protection and electrical services using other columns as locations for downcomers.

It was decided that any location changes would be recorded on this master plan and prints would be distributed to the various departments to insure proper coordination. This proved to be a wise decision, as the revisions which later developed could have resulted in costly interferences.

Zoning System

Due to the nature of the construction and the physical limitations for location of mechanical and electrical services, a zoning system was devised for all work above the bottom chords of the trusses. By "nature of construction," we refer to the fact that the building is pitched 10 inches from a high point at the west to a low point at the east. This may not seem to be much in a length of 1800 ft; however, when gravity flow of certain lines is required, definite problems may arise.

Further complications were caused by the nature of the



Compressor-cooling water pump is in foreground and two process cooling water pumps in the background.

electrical requirements. The continuous lighting, with messenger cable and trolley ducts required 24 inches above the bottom chord of the truss. The electrical feeder cable rack and the power bus ducts were also included in this space. With six inches allowed for sprinkler branches below the top chord of the trusses, a definite limitation existed for the remainder of the mechanical services.

The plan, therefore, from the outset of the project was to divide the remaining space into two sections, with the lower half for north and south traffic, and the upper half for east and west traffic. This appears to be a simple solution to the problem and is an effective plan for eliminating interferences of trades. Drawings were made indicating, in section, the location of each pipe in the building, and the allowable pitch to accommodate it, taking into account the inherent pitch in the building itself.

Coordination Problem Eliminated

The effectiveness of this method proved itself during construction, as the contractors for all services had no coordination problems, and the installation work was not placed on the sometimes customary "first-come, first-served" basis. The owner, also, was thus free to add his secondary piping systems without the fear of possible interferences.

Problems such as those presented in the design of the Ford Chassis Parts Plant challenge the mechanical engineer to develop building services to meet the needs of the constantly changing production requirements in the modern industrial plant.

Outdoor Ice Skating Rink Constructed in St. Louis

The Mark C. Steinberg Memorial outdoor ice skating rink in Forest Park, St. Louis, Mo., will be placed in service this winter.

It measures 230 ft long and 120 ft wide and will cost over $800,000, and the rink will be one of the largest of its kind in the United States.

The steel pipe will be laid 1½ in. below the surface of a 5½ in. slab of concrete. The pipe will be placed parallel to the 120 foot length in 922 rows spaced at a little over an inch part. When finished, the pipe will resemble a huge flat radiator with 461 loops. The pipes on the north end of the rink will be connected together by loops and the south end of each length will be connected to a steel pipe called a "header" measuring from 6 to 14 inches in diameter.

Before the pipe was laid, the area was surfaced with tons of small rock and screenings and rolled with a pavement roller. The pipe will be set on top of five gage wires resembling small chairs. The chairs are stapled to a wooden board which is nailed to leveling posts that have been driven into the ground and placed to within ⅛ in. tolerance.

After the piping is installed and welded, the 30,000 square foot area will be filled with concrete at one time. This monolithic slab will require from 500 to 600 cubic yards of concrete. More than fifty cement trucks will have to be used in this operation.

When completed, the slab will be pefectly level, not varying more than one-eighth of an inch.

The Shure-Richardson Company, St. Louis, has begun fabrication and installation of 128,917 ft of steel pipe of which is 112,578 ft is 1¼ in. pipe which will carry a refrigerant to freeze the surface of the rink. The steel piping was made by the National Tube Division of United States Steel Corporation and supplied through the Crane Company.

Wire chairs hold the 922 rows of pipe, 120 ft. long.

LOUIS BLENDERMANN ON

PIPING AND PLUMBING

Providing Access for Building Traps

A BUILDING trap is regarded by many of the plumbing codes as a very important component of the plumbing drainage system for it has a threefold purpose: (1) it acts as a barrier against the gases in the street sewer that would otherwise tend to enter the interior

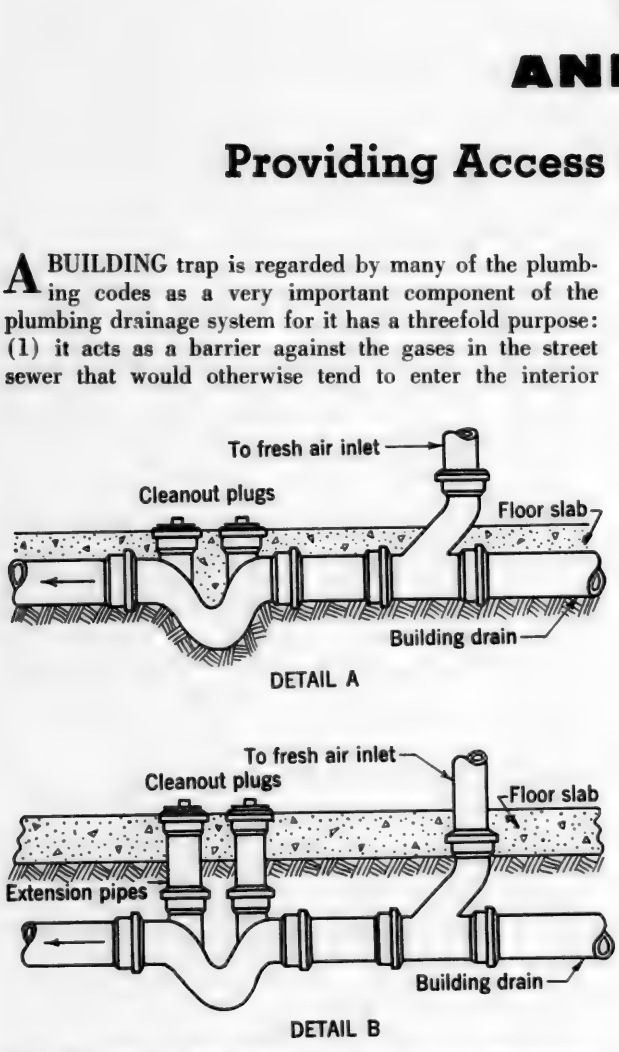


Fig. 1. Typical installation of building traps that are contained in a shallow bury.

plumbing system; (2) the trap offers a means of clearing stoppages that could develop in the building sewer between the building trap and the outside sewer facilities; (3) it is used in conjunction with the fresh air inlet to serve its function by permitting air to enter the sanitary system at its lowest point and circulate through the piping system to the vent stack terminal at the roof, thereby keeping the entire system fresh and clean.

Depending upon the location of the building drain, the building trap will be installed either above or below the ground. For example, if the building drain is located at the basement or cellar ceiling, the building trap will also be set in an exposed position. If the building drain is located underground, the building trap will also be installed underground.

This discussion will deal mostly with building traps located in the underground position. The terminology used for the various parts of the drainage system conforms with that given in the National Plumbing Code.

Shallow Piping Installations

When the underground piping runs in a building are not too long, the trap will be located rather close to the surface of the floor slab. A typical example of this condition is illustrated in Detail *A* of Fig. 1. Since the piping run is not too extensive, the trap by virtue of the drainage slope in the piping will be located rather close to the surface of the floor slab. This will permit the top of the cleanout hubs to be set flush with the floor slab where the cleanout plugs are easily removed.

Should the building trap be so located that it is impossible to terminate the top of the trap at the level of the floor slab, then extension pipes must be utilized. Detail *B* of Fig. 1, shows how this factor is achieved. The extension pipes are the most flexible means for arranging the installation, to enable the cleanout plugs to be flush with the floor.

A limit however, should be placed on the length of the extension pipes used, before this arrangement becomes

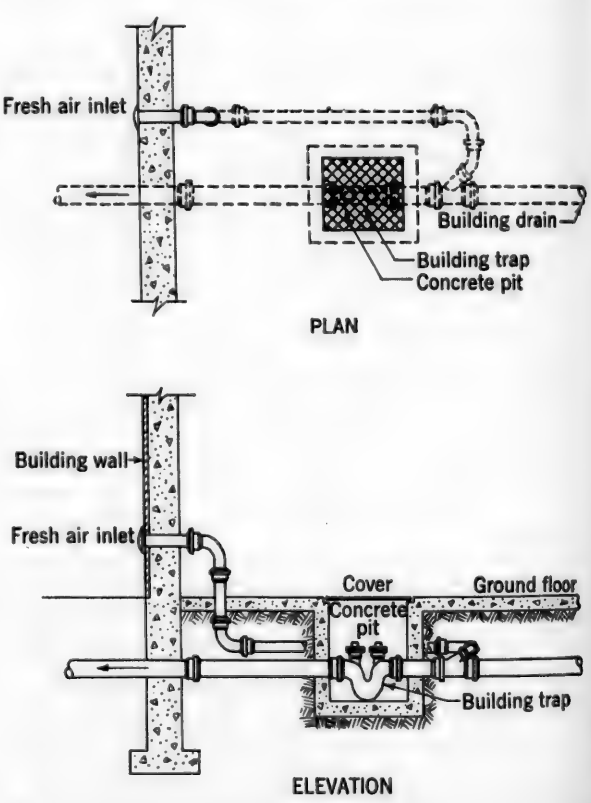


Fig. 2. Location of concrete pit and the arrangement of component piping.

too awkward. Therefore, in order to offer the most practical limits of function, the extension pipes should not exceed 18 in. in length. For building traps that are buried deeper, concrete pits must be employed.

Concrete Pits

Concrete pits offer access to a building trap that is located at a deeper elevation in the ground. Figure 2 shows a typical location of this pit in a building.

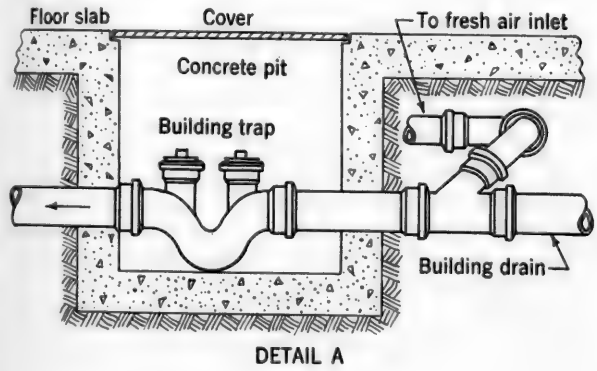
Referring to the plan in Fig. 2, it will be noted that the pit is placed at a point just inside the building wall. Concrete pits of course, can be placed outside the building wall, but this article is concerned only with the interior installation. Care must be exercised to coordinate the location of the concrete pit with the general contractor, thereby avoiding interference with the underground footings for the building.

The elevation in Fig. 2 illustrates how the component parts of the drainage piping are arranged, including the hookup to the fresh air inlet. Many types of fresh air inlet plates are available for this purpose and each is connected to the piping at the face of the wall in the manner intended by the manufacturer.

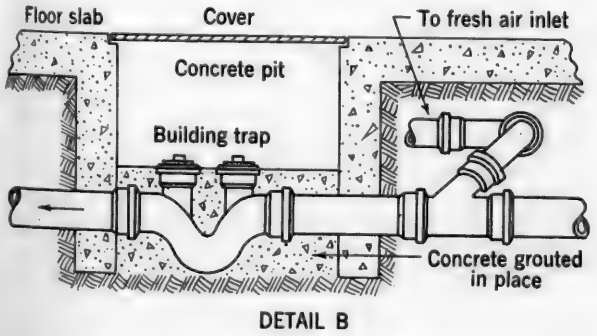
Construction of Concrete Pits

As the concrete pits are generally furnished by the general contractor, he must be supplied with data on the required size of the pit. Figure 3 suggests several factors that should be included in the construction of the concrete pit to offer sufficient access space for a man to work.

Detail *A* of Fig. 3 shows the type of pit normally provided in this instance while Detail *B* shows the type of pit provided when the bottom of the pit is left open for later grouting around the trap to a height that is level with the cleanout hub as shown.



DETAIL A



DETAIL B

Fig. 3. Installation of building traps in concrete pits.

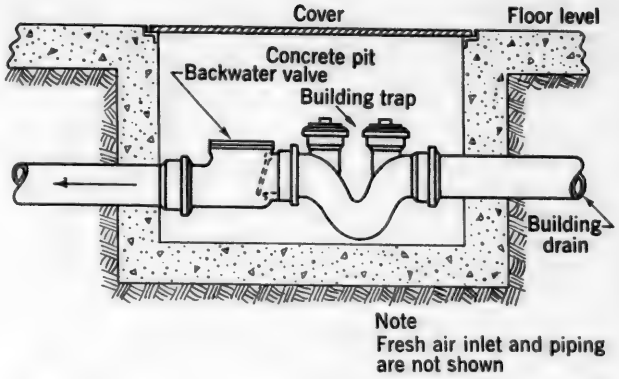


Fig. 4. Installation of building trap and backwater valve.

Of first importance in the construction of a concrete pit is the physical size of the pit itself. The length of the pit should be sufficient to allow enough room around the hubs of the fittings to permit ease in pouring lead and the caulking of joints. In addition, the pit should be wide enough to offer a man complete freedom in performing the task of clearing stoppages. This provision is especially important when the pit is a fairly deep one because it means that a man will have to lower himself into the pit to accomplish the task.

A checkered steel cover is usually placed over the pit. The cover should be of a thickness that will best sustain the loads imposed on it. The cover will rest on a suitable frame set integral with the concrete itself. If the pit opening is rather large, then structural members may be required for the cover for additional strength. A recessed handle in the cover will allow for easy lifting of the cover.

This is the general type of pit that is provided for the building trap. Since the fresh air connection piping is not included in the pit, space will not have to be allotted for it. However, if it is desired to include this piping connection in the pit, then it is necessary only to lengthen the pit.

Backwater Valves

Where building drains are subjected to backwater conditions that originate in the street sewer facilities, suitable protection must be considered. Backwater valves, generally employed for a safeguard, prevent the sewer water, caused by storm, stoppages or other reasons from entering the interior piping system where it can cause flooding of the lower floor levels. When a backwater valve is installed, it should be included in the pit with the building trap. Figure 4 shows such an installation.

As detailed in Fig. 4, the backwater valve is included in the same pit with the building trap. Here again, the pit must be of sufficient length to permit the proper pouring and caulking of the cast iron joints. It is also vital in this instance that the pit be wide enough to allow ease in maintaining the backwater valve to keep the flapper and valve seat clean.

Watertight Installations

Another problem that frequently must be considered by the engineer is the installation of the building trap in a concrete pit that is to be waterproofed. When ground water conditions exist, special care must be taken to

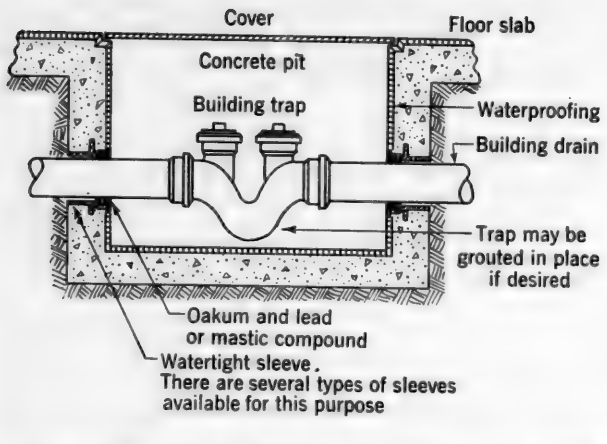

Cover
Floor slab
Concrete pit
Building trap
Waterproofing
Building drain
Trap may be grouted in place if desired
Oakum and lead or mastic compound
Watertight sleeve. There are several types of sleeves available for this purpose

Fig. 5. Suggested construction of concrete pit in areas where ground water conditions exist.

ensure a watertight slab. Likewise, the same consideration must be applied to the pit. The watertight sleeves are required for the passage of the piping through the walls of the pit. Fig. 5, demonstrates how this provision can be accomplished.

There are many types of manufactured sleeves available for this purpose. The sleeve shown in the illustration has been used for example only and does not indicate a preference. The drainage line passes through this sleeve. Oakum and lead or mastic compound is used to make watertight the void between the sleeve and the piping. When carefully installed, this method provides a dependable watertight connection.

Deep Concrete Pits

Very often, the drainage line because of its long run will be located at a considerable depth in the ground. When this occurs it is necessary to provide a deep pit,

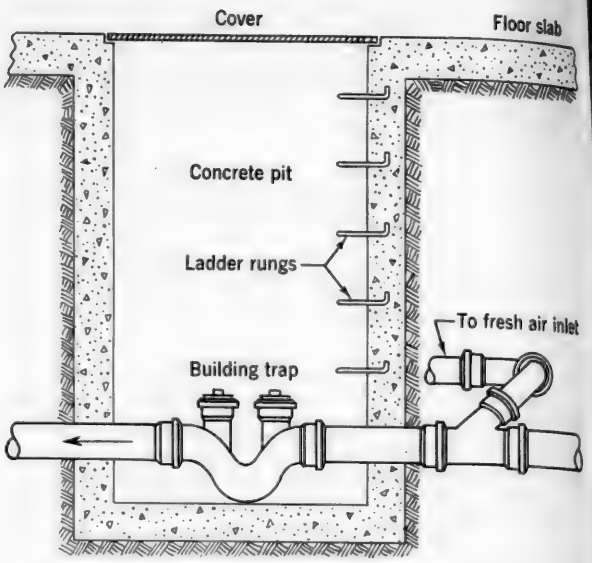


Fig. 6. Construction of concrete pit when underground drainage line is buried at a deep elevation.

as shown in Fig. 6, constructed in the same manner as the others shown with the exception that the walls of the pit are of a heavier masonry construction. In addition, a maintenance work ladder consisting of iron rungs is embedded in a wall of the pit. It is of utmost importance, in this case, that the pit be of sufficient size to provide the needed space in which to work.

Regardless of the conditions that may prevail at the site which have a direct effect on the building drain, proper access to the building trap can be provided by one of the methods shown. It is always good practice for the engineer to detail on his drawings the specific type of access he wishes to provide.

Solar Influences on Weather

Solar radiation provides practically the whole energy responsible for the motion of the atmosphere. The variations of this energy associated with the change between day and night and with the march of the seasons manifest themselves in diurnal and seasonal rhythms of the atmosphere. Under these conditions it is legitimate to inquire whether changes occur in the energy output of the sun and whether these changes are reflected in the atmosphere, especially in its lower part where the phenomena occur which we call "weather." A statement summing up the present state of knowledge and indicating fruitful lines of further study of the problem has been published by the American Meteorological Society. The following is an excerpt from the statement.

Efforts to find connections between solar activity and weather have so far mainly been based on a statistical approach. Some few results have been obtained that are highly suggestive but none of these studies have yet produced any conclusive evidence that relationships do indeed exist. Whether any of the more encouraging results are of practical importance for weather forecasting is a question which cannot now be answered affirmatively.

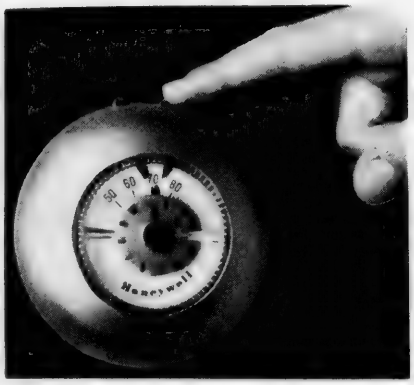
One of the great difficulties hampering the statistical study of solar-weather relationships is the lack of adequate solar parameters, or characteristic constants, with which to correlate meteorological variables. Sunspot numbers have been used most frequently because long series of data are available. They are apparently more or less closely correlated to those solar regions from which the radiations emanate that produce terrestrial effects. However, with the progress of research in solar physics it has become evident that sunspots are not the best indicators of the varied radiations emitted by the sun. Indices to express these radiations more directly are only now becoming available. Thus statistical investigations relating these newer parameters to variations in the lower atmosphere cannot yet be performed over long time intervals. As more is learned about the high atmospheric levels, it may be that new and more convincing relations between solar activity and weather can be found when the parameters characterizing the state of the sun become more adequate.

NEWS OF EQUIPMENT AND MATERIALS

Use the convenient prepaid postcard appearing on the last page for securing further information on new equipment and materials described in this department.

Switch-Back Thermostat

Minneapolis-Honeywell Regulator Co., Minneapolis, Minn., has added a residential switch-back model to its line of round thermostats. Called Day-Nite, and designated T832, it provides for a simple adjustment of a spring-wound timer to assure lowered temperature with automatic heat pickup at any desired hour.



Fingertip adjustment tabs allow the homeowner to easily select the temperature he wants. Provision is made for switch-back of heat in quarter-hour increments up to 10 hours.

Enclosed, dust-free mercury switch never gets clogged with lint, the company states. List price is twenty-eight dollars and ninety cents.

More information? Circle Item 1, postcard, last page.

Two Large Water Savers

Two condensers to alleviate water supply problems in larger air conditioning and refrigeration systems are developed by Carrier Corp., Syracuse, N. Y.

One is an evaporative condenser, illustrated left, available in 13 sizes to cover a range of from 5 to 250 tons. It employs a new method of wetting coils with vaporized water drawing heat from the refrigerating system.

The other, at right, is an air-cooled condenser produced in seven sizes from two to 38 tons. This unit dissipates heat from the refrigerant directly to the air, requiring no water at all. The largest size in the line is one of the highest-capacity units of this type ever produced in a single cabinet, the company said.

Water distributing system in the evaporative condenser has a drawer-like pan at the top of the unit, in which water delivered by a small recirculating pump is evenly metered through orifice holes onto an interceptor screen. Hundreds of holes in the screen break the water into droplets, literally drenching the coil surfaces. The new approach does away with spray nozzles and spray water eliminator assemblies.

Both condensers can also be installed indoors or out.

More information? Circle Item 2, postcard, last page.

Lightweight, Shaded-Pole Motor

A new shaded-pole motor, 33% lighter in weight than previous designs, has been developed for such applications as blowers, cooling fans, evaporative coolers, and air conditioners. Available from Specialty Motor Department of General Electric Co., Schenectady, N. Y., the two-bearing unit is less than 4 inches in length. It weighs 5½ lb. The slim motor is the first of its kind to provide ventilation openings in both the shell and end shields without additional cost to customers, according to the company.

The motor is available in ratings from 35-mhp to 1/10-hp in 4 and 6-pole sizes. Its design versatility allows one, two, or three speeds in either direction or both, depending on requirements.

More information? Circle Item 3, postcard, last page.

Low-Velocity Roof Ventilator

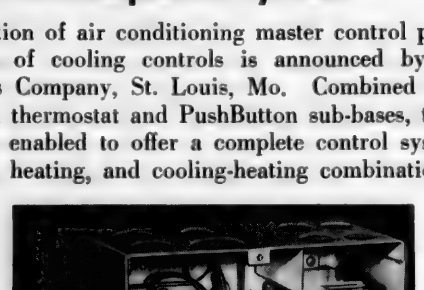
New addition to the company's line of roof ventilators is the T-type roof fan, introduced by Allen Cooler & Ventilator, Inc., Rochester, Mich. The new fan is of the low-velocity type and is designed especially for one-story, flat-roof public and commercial buildings.

The silhouette is only 10⅞-inches high on the 420 cfm model. It is available in galvanized steel or aluminum with optional automatic dampers. Used in connection with the company's I-line series, the new model makes it possible to provide the same general design and low contour for all ventilators on a roof in capacities from 420 to 34,000 cfm.

More information? Circle Item 4, postcard, last page.

Control Completes System

Addition of air conditioning master control panels to its line of cooling controls is announced by White-Rodgers Company, St. Louis, Mo. Combined with its Fashion thermostat and PushButton sub-bases, the company is enabled to offer a complete control system for cooling, heating, and cooling-heating combinations.



Control panels are available in single and two-piece types. The single panel, for use on package cooling units and those having water-cooled condensing units, incorporates both the evaporating sequencing and condenser sections in one enclosure.

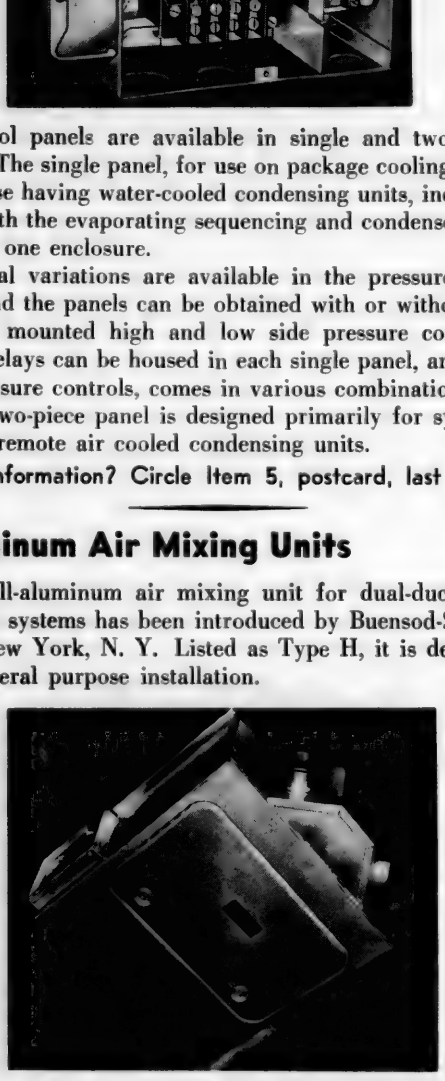
Several variations are available in the pressure controls, and the panels can be obtained with or without integrally mounted high and low side pressure controls. Three relays can be housed in each single panel, and like the pressure controls, comes in various combinations.

The two-piece panel is designed primarily for systems having remote air cooled condensing units.

More information? Circle Item 5, postcard, last page.

Aluminum Air Mixing Units

An all-aluminum air mixing unit for dual-duct high velocity systems has been introduced by Buensod-Stacey, Inc., New York, N. Y. Listed as Type H, it is designed for general purpose installation.



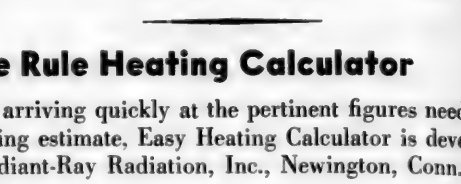
Previously announced was an all-aluminum unit primarily for under-window installation. This general purpose unit will be used generally for overhead distribution of air through standard diffusers, grilles, or other types of outlets, the company says.

The unit is manufactured in five sizes with capacities ranging from 70 to 800 cfm. The accompanying photograph shows size 4H, with a capacity of 70 to 200 cfm. Lightness is a principal feature. It weighs 40% less than ordinary sheet steel units.

More information? Circle Item 6, postcard, last page.

Slide Rule Heating Calculator

For arriving quickly at the pertinent figures needed in a heating estimate, Easy Heating Calculator is developed by Radiant-Ray Radiation, Inc., Newington, Conn.

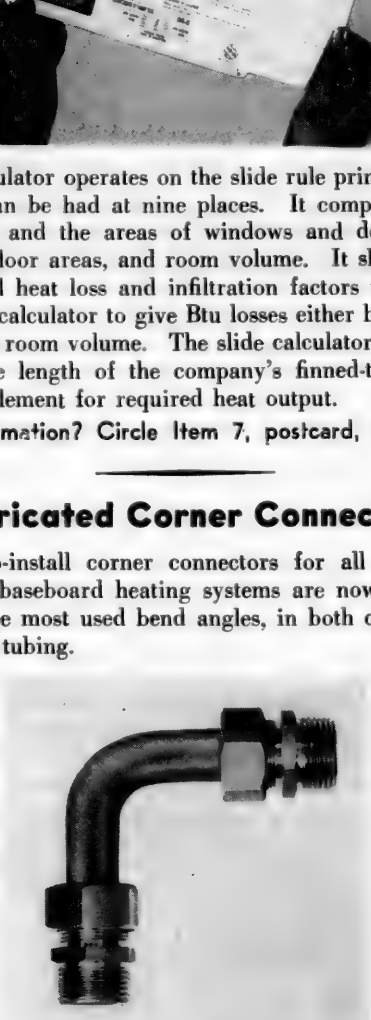


The calculator operates on the slide rule principle, and readings can be had at nine places. It computes gross wall areas, and the areas of windows and doors; also ceiling or floor areas, and room volume. It shows commonly used heat loss and infiltration factors for use in setting the calculator to give Btu losses either by exposed surfaces or room volume. The slide calculator also indicates active length of the company's finned-tube, IBR-approved element for required heat output.

More information? Circle Item 7, postcard, last page.

Prefabricated Corner Connectors

Ready-to-install corner connectors for all makes of hot water baseboard heating systems are now available in the three most used bend angles, in both copper and aluminum tubing.

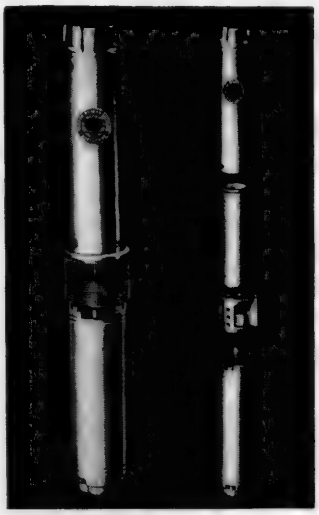


These timesaving fittings are manufactured and stocked in 45, 90, and 180-deg bends by General Fittings Company, East Greenwich, R. I. All are ¾-inch male pipe thread with ¾-inch OD compression sleeve brass or aluminum unions. Connectors require no sweating.

More information? Circle Item 8, postcard, last page.

High Pressure Water Pumps

A line of high pressure, large capacity, submersible water pumps, trade-named Golden Ace, is developed by The Duro Co., Dayton, Ohio.



Pump and motor assembly consists of three basic units: (1) heavy brass pump housing bolted to pump cap assembly, (2) cast bronze, precision machined impeller-diffuser stack mounted on splined, stainless steel shaft, and (3) high torque electric motor completely sealed in stainless steel case.

Only a small screwdriver, end wrench, and Allen socket wrench are required to assemble or disassemble pump for servicing or cleaning.

Pump is designed for 4-inch or larger wells. Capacities up to 1700 gph are provided, and maximum pumping depth is 1000 ft. A 6-page catalog gives all data.

More information? Circle Item 9, postcard, last page.

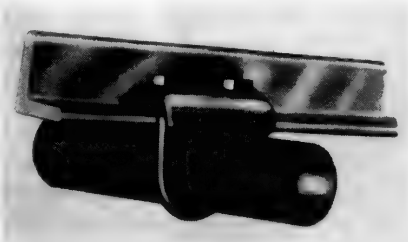
Thermostatic Tempering Valves

With the introduction of a new ½-inch tempering valve, and the redesign of their existing ¾-inch valve, Holby Tempering Valve Co., Inc., New York, N. Y., announces the completion of its line of automatic thermostatic tempering valves for controlling the temperature of hot water used in domestic, commercial, and industrial fields. The complete line now ranges from ½ through 4-inch sizes.

More information? Circle Item 10, postcard, last page.

Right Angle Pipe Hanger

Available from Ramco Manufacturing Co., Roselle Park, N. J., is a new type of right angle pipe hanger, called Type X. The company claims that unlike supports of the set screw or cast iron type which cannot maintain constant pressure under vibration or thermal variations,



the Type X retains constant effective clamping tension by the spring action designed into the saddle. This feature makes the hanger well suited for even heavy duty industrial applications.

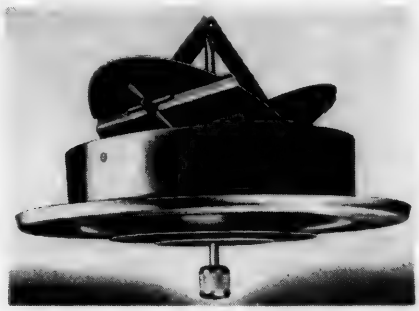
The low cost right angle hanger can be used with standard pipe or rigid steel conduit for mounting on structural flanges up to ⅞-inch thick. Each hanger is furnished complete with U-bolt and nut assembly. It is available in pipe sizes from ⅜ to 2 inches.

More information? Circle Item 11, postcard, last page.

Push-Pull Diffuser Damper

A friction-controlled butterfly damper is marketed by Krueger Air Conditioning Corp., Tucson, Ariz., for its No. 200 Series round ceiling diffuser.

The new design eliminates the standardized spring loading and pull chain control of the damper. A central



shaft with knurled handle gives full 90-deg control of both butterfly damper leaves by simply pushing or pulling the shaft to the desired control position. A leaf spring exerts constant tension against the shaft to maintain friction control of the adjustment in all positions from full open to tight shut.

The round ceiling diffuser, available in 6 to 14-inch dia, offers full 360 deg diffusion air pattern.

More information? Circle Item 12, postcard, last page.

Sleet and Ice Alarm System

A new method of providing protection against the formation of ice on various outdoor installations has recently been announced by the American Instrument Co., Inc., Silver Spring, Md. The Aminco Sleet and Ice Alarm System solves such diversified problems as poor radio and television transmission due to tower icing, the freezing of gas-line pumping stations, and trailer-truck loading accidents due to ice or slush-covered loading ramps.

This system detects climatic conditions favoring formation of ice, and automatically actuates defrosting heaters or provides a visual alarm for the manual actuation of the heaters.

It consists of one controller, and either one or two Sleet and Ice Detector sensing units. The sensing unit contains a thermostat and a precipitation-detecting element. These are arranged so that an alarm is actuated when the temperature is below approximately 35 deg F with precipitation present. Shortly after the precipitation ceases, the system will indicate clear conditions. The sensing unit can be located as far as 2000 feet from the control unit.

More information? Circle Item 13, postcard, last page.

Steel Wedge Gate Valves

For water, steam, gas, or air service at temperatures up to 850 deg F and for oil or oil vapor up to 1000 deg, a line of 600-lb steel wedge gate valves is designed by Walworth Co., New York, N. Y.

Valve body is of forged carbon steel. This valve has a non-shock pressure-temperature rating of 420 psi at 1000 deg and a rating of 2000 psi at 100 deg. Stem, wedge and seat rings are made of 13% chromium stainless steel for longer service life. The wedge has a hardness of 500 Brinell and is accurately guided by ribs in the body.

All valves in the line are of the outside screw and yoke design. These valves are designed to permit repacking under pressure when fully opened. Repacking is made easy by the curved yoke arms and swing type eyebolts which provide free access to the stuffing box.

Available with screwed or socket welding ends, those with union bonnet are available in 8 sizes from ¼ to 2 inches; those with bolted bonnets, in 6 sizes from ½ to 2 inches.

More information? Circle Item 14, postcard, last page.

Wet Base Boiler

Burnham Corporation, Irvington, N. Y., announces a wet base cast-iron boiler for hot water heating. Available in two sizes, 445 sq ft and 500 sq ft I-B-R net ratings, it comes in three models: a completely packaged unit called Jubilee-Pak, the Jubilee Oil Heating Unit and the Jubilee Boiler Unit, all with flush or extended jackets.

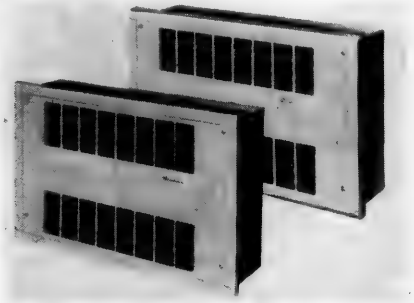
The boiler is designed for oil firing exclusively. Its wet base construction surrounds the combustion chamber with water-backed heating surface and prevents heat penetration to the floor. As a result, it can be installed on combustible floors without a special sub-base.

In addition to heating the home, the boiler provides year-round automatic hot faucet water. It features all-copper built-in tankless heaters of Trufin construction at top of boiler, where they are submerged in the hottest water for swift, efficient heat transfer. Six-inch top nipple ports insure complete rapid water flow with faster circulation and uniform water temperature.

More information? Circle Item 15, postcard, last page.

Cabinet Unit Enclosure Styles

Two basic enclosure styles which substantially increase installation and application flexibilities of its line of cabinet units are announced by Modine Manufacturing Co., Racine, Wis. These units were designed specially to speed installation, provide a better and more attractive job, and to simplify any on-the-job corrections.



These new types can be installed in the wall, in the ceiling, inverted, fully recessed, or partially recessed to various depths. They consist of a universal cabinet and front panel with a choice of several overlap designs.

The cabinet units are available in capacities ranging from 120 to 640 EDR and are designed for high capacity heating with steam or hot water. Basic designations of the new types are FF-FRB and FF-PRB. Model FF-FRB (lower left in photo) is designed for fully recessed installation in a ceiling or in a wall above the baseboard. When used without a bottom overlap, the unit is designated FF-FRG, and as such is suited for recessed installation in the wall at floor level. Model FF-PRB is designed for partial recessing in the ceiling or above the baseboard. Without the bottom overlap, it becomes an FF-PRG and can be mounted in the wall at floor level.

More information? Circle Item 16, postcard, last page.

Multi-Stage Jet Pump

Development of a vertically-mounted multi-stage jet pump is announced by The Morrison Company, Milwaukee, Wis.

The new Aqua-Flo multi-stage pump, Model AJ-100-3F, offers high pumping efficiency at low power costs. Designed for either shallow or deep wells, its three-stage operation provides maximum pressures for wells as deep as 200 ft. Powered by a 1-hp capacitor-type motor, it is adaptable to minimum well sizes of 2 inches and up.

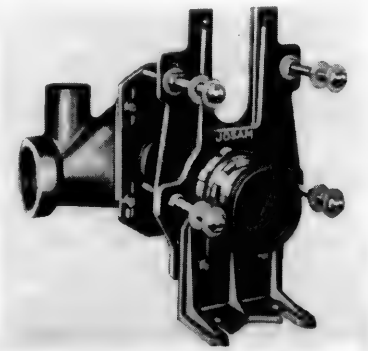
Pump is designed for capacities up to 3000 gpm with pressure range from 30 to 60 psi.

More information? Circle Item 17, postcard, last page.

Universal Closet Carrier

Unitron closet carrier, product of Josam Mfg. Co., Michigan City, Ind., is so designed that one type of carrier is adjustable to support all wall-hung water closets and women's urinals, eliminating the necessity of using different carriers for blow-out or syphon jet fixtures.

Packed in a box together with adjustable extension, gaskets, coupling nipple, and necessary nuts, studs, washers, and caps, the unit adapts to any type or make of fixture.



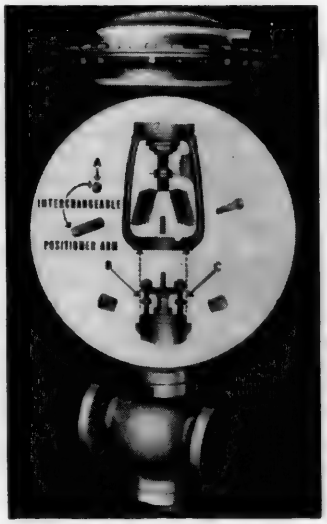
Greater cantilever balance and more flexible structural design is provided through an arrangement that allows carrier to be independent of the fitting, making it possible to place the carrier at any distance from the fitting. One-third less pipe chase width is needed, as a result. Also, where installation is back-to-back, there is no effect on water seal of opposite fixture.

More information? Circle Item 18, postcard, last page.

Pneumatic Actuator

Completely redesigned diaphragm control valve pneumatic actuators are now being manufactured by Hammel-Dahl Co., Warwick Industrial Park, Providence, R. I.

As shown in the accompanying illustration, the design incorporates a split-coupling which joins the actuator spring stem to the valve plug stem. The stems do not engage or meet. By loosening nuts *A*, *B*, and *C*, the actuator may be lifted over the plug stem. The slotted holding clips, the clearance denoted by the dotted lines and arrows, and the coupling arrangement, allow the actuator to be completely removed without disturbing the packing box bolting.



The coupling has left-hand (upper) and right-hand (lower) threads, and in addition to being a twist-proof clamp for joining the stems, it acts as a turnbuckle for the adjustment of plug seating tension.

No valve disassembly is required when positioner is mounted in the field. Every valve is equipped with a universal bracket for the mounting of any positioner. Nut *A* is removed and the appropriate positioner arm threads to the same coupling screw.

Actuators are available in three standard sizes, with each size covering twelve different constructions. Three spring ranges, 3-15, 5-25, and 6-30 psi, are completely interchangeable in each size and type of actuator.

More information? Circle Item 19, postcard, last page.

Copper-Nickel Water Heater

A commercial automatic gas water heater with copper-nickel alloy tank is produced by Ruud Mfg. Co., Kalamazoo, Mich. Model CST 80-80 is designed for use with all gases.

Installed singly or in multiples for single or two-temperature operation, it is approved by AGA Laboratories as an automatic storage water heater and as a circulating tank water heater. Both 140-deg and 180-deg hot water for dish washing can be furnished from the single tank. Multiple installations may be manifolded with the company's Equaflow kit.

Recovery rating is 80 gph at 100-deg rise. Tank capacity is 67 gal of water. Btu input per hr is 95,200. Unit occupies a floor space of 30 by 30 inches, and has a height of 63 inches.

More information? Circle Item 20, postcard, last page.

Remote Valve Positioner

Val-Con is an electrical control for remote valve positioning available from Sparton Controls System Div., Sparton Corp., Jackson, Mich.

Featured is upper and lower valve limit signals plus meter indication of valve position. It operates over leased

lines or standard 2-wire and ground systems. Positive indication of limits is accomplished through definite departure of needle into color-coded segments at the extreme ends of the scale. This indication is independent of all normal telemetering functions.

Unit operates with present motor controllers over any practical distance from a few feet to many miles. Two independent visual alarms are included for such functions as power failure, pressure, temperature, or overload. An audible alarm may be coupled to the visual alarm.

More information? Circle Item 21, postcard, last page.

Juvenile Water Cooler

Oasis juvenile water cooler is designed exclusively for youngsters by Ebco Mfg. Co., Columbus, Ohio. With their own bantam-size, 34-inch high water cooler, youngsters have easy access to the water without danger of stress or strain. Its utility is evidenced by present in-

stallations all over the nation in elementary schools, kindergartens, churches, nurseries, pools, parks, camps, and other youth centers.

Cooler carries a full 5-year warranty. It will take a remote fountain and/or glass filler attachment, and includes a pre-cooler and a 5-quart reserve storage tank.

More information? Circle Item 22, postcard, last page.

Blowproof Tank Gage

An improved type manometer column gage which effectively traps the indicating fluid within the column, since it is equipped with a blow-proof valve that eliminates the possibility of blowing mercury or other liquids out of the manometer tube, is available from Liquidvision Gauge & Control Corp., Oceanside, N. Y. This manometer, called Levelux, is suitable for use as a liquid level indicator, a differential pressure gage, or for indicating flow of liquids or gases through pipe lines.

A column-type manometer is the most accurate type of indicator for the above mentioned measurement problems, the company states. Heretofore, the difficulty had been to trap the mercury or other indicating fluid within the column when unusual conditions occurred that subjected the column of liquid to excessive pressure or sudden surges of pressure in the air bell of an indicator such as a tank gage. This over pressure often blew the liquid out of the column and thereby rendered the gage inoperative. This difficulty has now been definitely overcome, it is stated. The blow-proof valve furnished with this gage is so designed and constructed that it is impossible to blow the mercury out of the column.

Manometer has been approved for Naval and Marine use to show the height of bunker oil or other viscous liquids aboard ship. It is also an accurate indicator for large molasses tanks, corn syrup, and other heavy liquids that tend to congeal. It is equally effective on solvents or lighter liquids.

More information? Circle Item 23, postcard, last page.

Roof-Mounted Air Conditioner

In conjunction with a broadening of its line, an air cooled, self-contained air conditioner for roof-top mounting is announced by Betz Division, Bohn Aluminum & Brass Corp., Danville, Ill. The unit is available in three models: RTA 36, 3 tons; RTA 60, 5 tons; and RTA 90, 7½ tons.

Designed for direct air conditioning of stores, shops, or small industrial buildings, the roof-mounted unit requires only one ceiling opening. A combination supply and return diffuser grille is utilized.

The cooling coil is set at an angle to expose maximum surface to the air stream. The air cooled condenser is rated so that full tonnage capacity is obtained from the compressor.

More information? Circle Item 24, postcard, last page.

High Capacity Electronic Cleaner

An addition to their high efficiency line of electronic air cleaners is introduced by Trion, Inc., McKees Rocks, Pa. The HCC (High Capacity Cell) electronic air cleaner will clean 350 to 600 cfm of air per square foot of gross face area at efficiencies from 85 to 97% as determined by the National Bureau of Standards Dust-Spot Test Method using normal atmospheric air. It will handle 50% more air than a standard unit, the company states, thereby making it possible to match heating-cooling coil face areas.

HCC units are equipped with a motorized moving cold-water washer and adhesive applicators. The company is offering the units as field assembled equipment and in custom-built packaged equipment in a range of sizes to fit any type of installation.

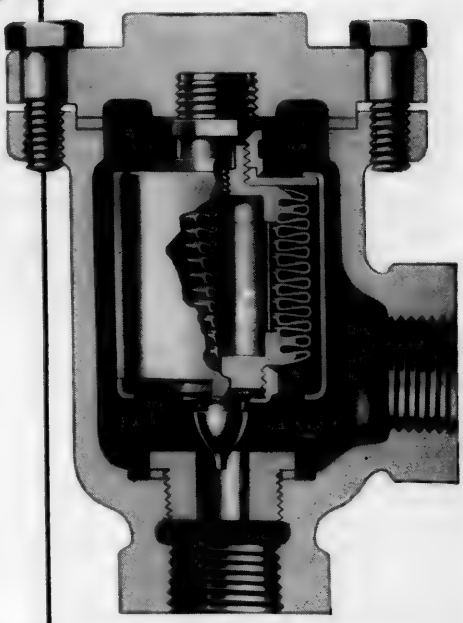
More information? Circle Item 25, postcard, last page.

(Continued on page 110)

Proven by performance!

All departments agree on operating efficiency of SARCO Thermostatic Steam Trap

	MAINTENANCE	PURCHASING	STORES
1. **Same head and seat for 0-300 psi** — no changing of heads and seats for varying loads and pressures.	✓	✓	✓
2. **Fewer parts to stock** — same bellows, head and seat for 0-300 psi.		✓	✓
3. **Greatest capacity per dollar cost** — 1" size discharges 9,650 lbs/hr at 10°F below steam temperature, 125 psi.		✓	
4. **Very compact and light** — ¾" size fits in palm of the hand. Weighs only 3¾ lbs.	✓		
5. **Freeze-proof**—wide open, self-draining when cold.	✓		
6. **Only one working part** — the thermostatic element. Can be inspected or replaced in few minutes without moving trap from line.	✓		



SARCO

Balanced Pressure

THERMOSTATIC STEAM TRAP

Same seat and head for all pressures to 300 psi

•

Sizes ½" to 2"

•

Write for Bulletin 250

Proven by testing!

Steam-tested — every single Sarco Thermostatic is steam-tested at rated maximum pressure.

Proven "on-the-job" performance — maximum fatigue-resistance for every thermostatic element is assured by Sarco's exclusive helical corrugating process and fatigue testing method.

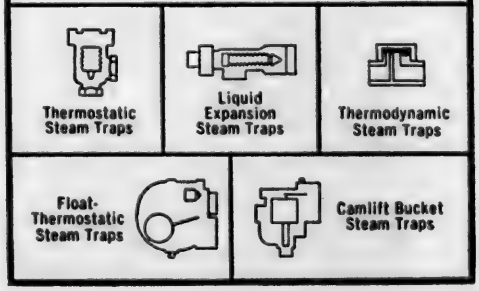
Quality Control — every step of manufacture under exacting tests and controls . . . in Sarco's own plant.

Proven by experience!

During past 40 years, over 1,000,000 Sarco Thermostatics have been installed in countries throughout the world!

Only Sarco Makes All 5 Types

. . . that's why Sarco can give impartial advice on trap selection



Sarco Company, Inc., Empire State Bldg., New York City

AN AFFILIATE OF SARCOTHERM CONTROLS, INC.

2212-B

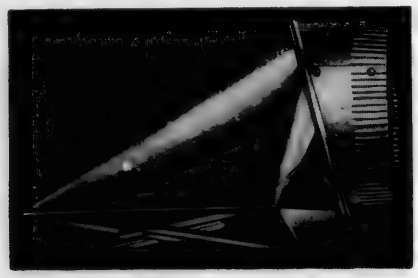
STEAM TRAPS • TEMPERATURE CONTROLLERS • STRAINERS • HEATING SPECIALTIES

For Temperature Regulators, see Sarco Ad, Page 123

(Continued from page 108)

Top, Side-Style Duct Takeoffs

Standard Furnace Supply Co., Ltd., Omaha, Neb., makes two additional styles of their Clix-On duct takeoff. To suit every requirement, the takeoff is now made in straight top and straight side, non-adjustable styles, in collar sizes from 4 through 8 inches. A straight-top takeoff is illustrated.



These new patterns incorporate the same engineered design features of the company's adjustable takeoff, with smooth entrance area and sweep flow contour, which permit unrestricted movement of air and low amount of air turbulence.

An inexperienced installer can scribe and cut an opening in the duct or plenum, and permanently attach a takeoff in the opening in as little as two or three minutes time.

More information? Circle Item 26, postcard, last page.

Three Oil Burners Added

Three oil burners, designed for installation in large homes, public buildings, and small commercial establishments, are added to the line of The Carlin Co., Wethersfield, Conn.

Designated Models 500S-35, 700S-35 and 650, the burners have firing ranges respectively of 3.00 to 4.50 gph., 3.50 to 7.00 gph., and 3.50 to 6.50 gph. Models 500S-35 and 700S-35 feature "shell head" while Model 650 has the standard company combustion head. Like all its other burners, these models burn No. 2 fuel oil.

More information? Circle Item 27, postcard, last page.

Flush-Cutting Saw

An electric reciprocating saw, produced by R. C. S. Tool Corp., Bloomington, Ill., enables user to cut flush with any surface in any position, performing operations heretofore regarded as very difficult.

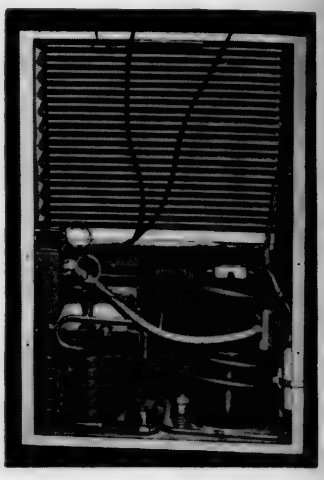
A flush-cut accessory on Model 250 Super Saw permits removing baseboards, bolts, nails, pipe, and conduit flush with the surface. This offset attachment is reversible for right or left-hand cuts. A complete line of blades for any cutting application is available. Metal-cutting blades are color-coded for number of teeth per inch, and all blades cut through embedded nails.

The electric saw weighs only 8 lb, has an overall length of 16 inches minus sawblade, and is equipped with a ½-hp, 5-amp motor. It delivers 2500 strokes per minute.

More information? Circle Item 28, postcard, last page.

Integrated Refrigeration Cycle

A free standing, hermetically sealed air conditioning unit with a cooling capacity of 65,000 Btu per hr and requiring only 36 by 22 inches in floor space, is announced by Heating and Air Conditioning Div., Stewart-Warner Corp., Lebanon, Ind.



For use in stores and offices, Flexible-Air, depending upon the requirements of the room in which it is located, may be fitted with additional four-way adjustable louver deflectors to produce a conditioned air pattern exactly as needed up to 360 deg surrounding the unit.

The fully hermetically sealed unit is claimed by the company to be new with the industry. The complete refrigeration cycle, as illustrated, including all controls, is a completely integrated unit, easily removed for unitary service. The tube-in-tube design of the water-cooled condenser unit assures maximum heat transfer from refrigerant to cooling water.

More information? Circle Item 29, postcard, last page.

Heat Absorbing Plate Glass

A neutral grey polished plate glass which combines glare and brightness reduction with heat absorbing advantages has added a new tool in the kit of architects, engineers, and designers working on schools, libraries, and kindred public buildings, according to Libbey-Owens-Ford Glass Co., Toledo, Ohio. The company has named the new glass Parallel-O-Grey. It is a twin-ground polished plate glass having greater uniformity of color and quality because it is melted in a large continuous furnace.

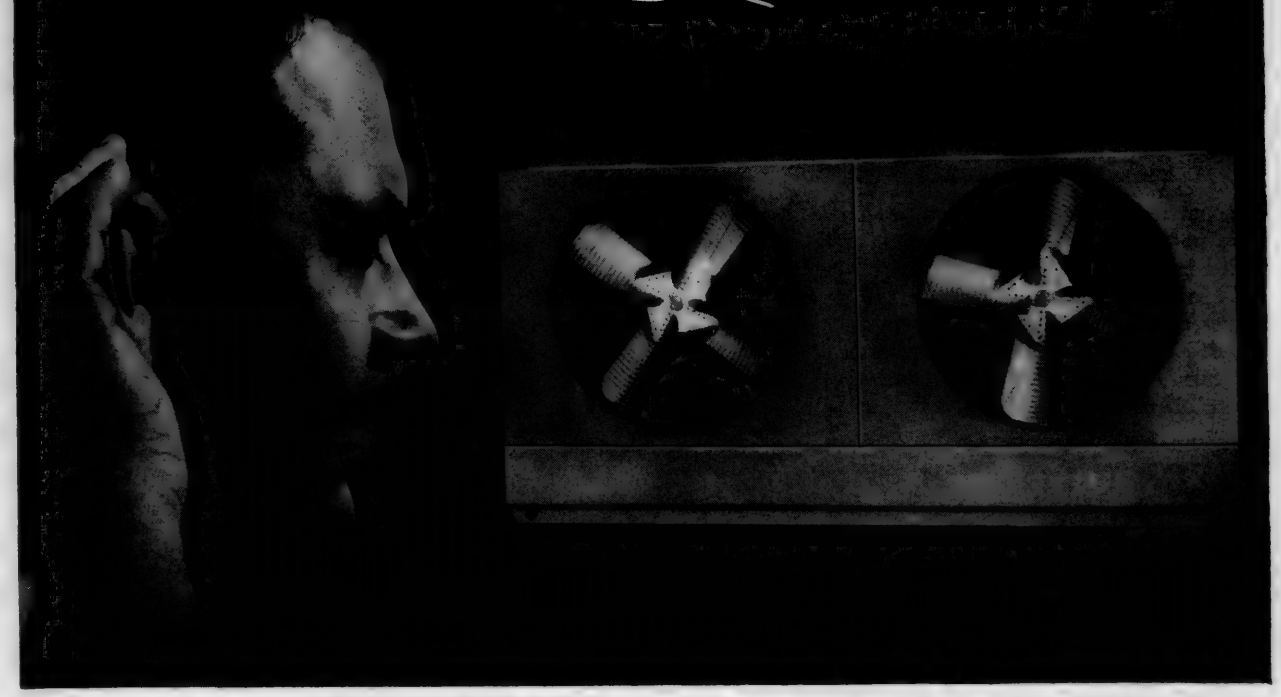
The lower light transmission of this new glass provides more comfortable eye conditions because it reduces glare and brightness contrast. It also reduces the input of the sun's heat. The combination of these good qualities in the new glass gives the architect greater flexibility.

More information? Circle Item 30, postcard, last page.

(Continued on page 112)

HALSTEAD & MITCHELL ENGINEERS PROVE . . .

A 100-TON COOLING TOWER CAN BE QUIET



HERE ARE TWO, NEW LARGE SIZES ADDED TO HALSTEAD & MITCHELL'S COMPETITIVELY-PRICED EC COOLING TOWER LINE

THE EC LINE. The addition of the 80- and 100-ton capacity towers extends the range of the more-value-per-dollar EC line. All 12 models, 5 to 100 tons, have outstanding features never before offered in this price group.

These include increased corrosion resistance due to rugged, 14-gage steel cabinets (12-gage sumps on the largest sizes) —weatherized by application of Vinsynite, Vinyl Zinc, and Chlorinated Rubber coatings. Exclusively, H&M offers pressure-creosoted wetted deck surfaces with the industry's only 20-Year Guarantee against rotting or damage due to fungus attack. New, sealed fan bearings are lubricated for life. Gravity-type distributing pans reduce pumping head, and cut down windage losses. Sump water levels are automatically controlled by integral float valves.

QUIET. Large diameter, four-bladed, deep pitch fans are belt-driven at low speeds by special weather and splash-proof motors. The EC-80 and EC-100 are driven at speeds of only 400 and 450 RPM. They're really quiet! Twin fans and drives power the three largest sizes, and all fans are of zinc plated, chromate dipped mild steel.

EC Series Cooling Towers are available in capacities of 5 thru 100 tons*in standard, factory assembled models, or as Take-Aparts (ECK Series) for difficult-to-get-at installations. Residential, direct-drive ECD Series, with all the custom features and also competitively priced, come in capacities of 2 thru 7½ tons. Call your nearest Halstead & Mitchell wholesaler for delivery and prices or write: *Halstead & Mitchell, Bessemer Building, Pittsburgh 22, Pa.*

WRITE FOR COMPLETE DETAILS

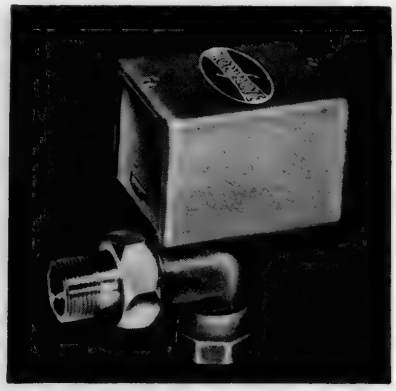
HM Halstead & Mitchell

(Continued from page 110)

Radiator Valve Turns on Heater

Zonvalve, a thermostatically-controlled valve manufactured by Heat-Timer Corp., New York, N. Y., replaces the ordinary radiator valve.

It is made in all standard sizes, for easy installation



on room radiators, or the supply piping for each zone. It is powered by an electric motor and requires no skilled electrical work, since it uses low-voltage wire.

When in *open* position, valve automatically turns on burner or circulator.

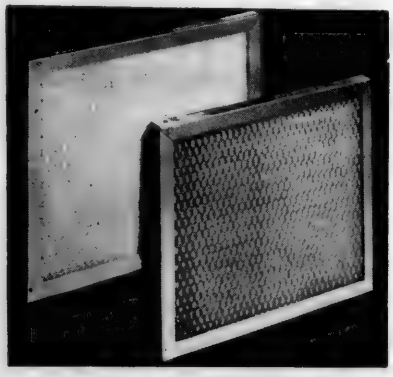
Unit is available as a complete package (valve-thermostat-transformer) ready for immediate installation. It is unconditionally guaranteed to operate with equal efficiency on steam and hot water systems.

More information? Circle Item 31, postcard, last page.

Washable, Permanent Filters

Permanent, washable Skuttle-Aire air filter, introduced by Skuttle Mfg. Co., Milford, Mich., is available in 10 standard one-inch sizes ranging from 10 x 20 to 15 x 30 inches, and 38 standard ½-inch sizes ranging from 6 x 20 to 14⅝ x 23¼ inches. Special sizes can be ordered.

Plastic filtering material used possesses built-in electro-static properties which assures uniform filtering and minimum air resistance, company says.



Each filter is encased in a riveted aluminum frame, and each contains four layers of thermo-plastic filtering media placed between expanded metal grilles. This design protects the filtering media and increases rigidity of the filter.

These filters replace conventional filters in either one-inch or two-inch frames. Where it is necessary to fill a two-inch space, spring clips will be furnished free, according to the company.

Its new filters are recommended by the company for use in warm air furnaces, central air conditioning systems, room coolers, and in other applications where air filters are required.

More information? Circle Item 32, postcard, last page.

Round Draft Control

A round Windmaster draft control is introduced by Lima Register Co., Lima, Ohio. This model retains the large 45 deg vane and calibrated weight developed for the company's square unit.

The round unit can be installed directly into a tee fitting. For straight furnace pipes, a special adapter has been developed that fits around the front half of the pipe and is secured at both top and bottom. The unit snaps into the adapter and is held firmly in place in front of the draft hole.

Like the square draft control, the companion model features non-rusting nylon bearings and positive open-shut action. Both units are made of heavy gage steel.

More information? Circle Item 33, postcard, last page.

Hard Chrome Flaring Cones

Tool chromium, having a hardness closely approaching that of diamond and surpassing that of any other metal, is now being used on all cones in flaring tools produced by The Imperial Brass Mfg. Co., Chicago, Ill.

Primary advantage of the development is that the finish of hard chromium reduces torque requirements for flaring by as much as 55%. An important flaring tool improvement, it was thoroughly researched and has been used, selectively, on the company's flaring tools for three years. The move to provide all flaring tool cones with the hard chrome finish comes as a result of the successful performance of these tools.

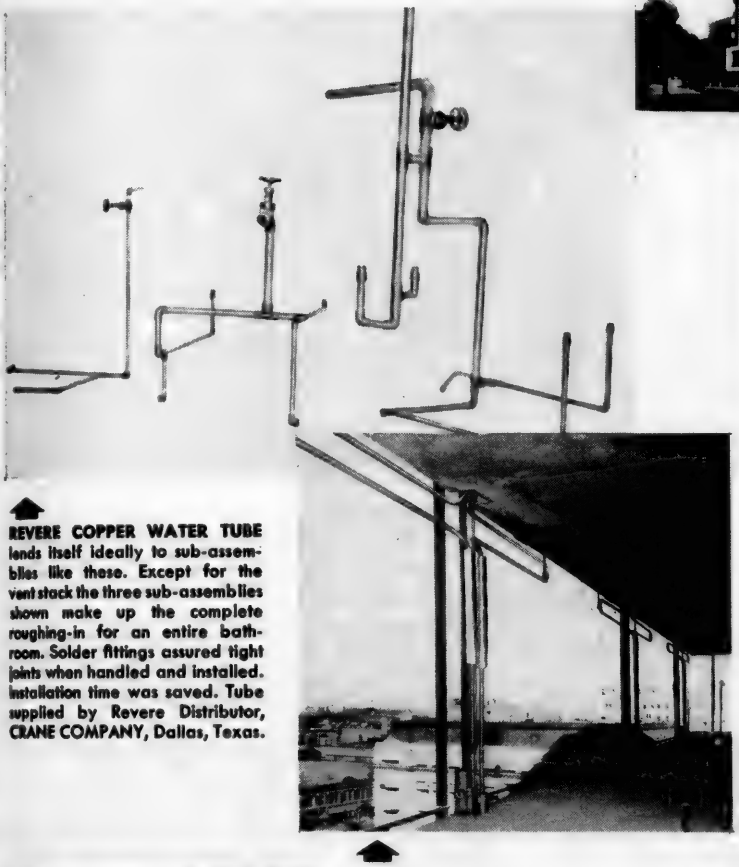
Besides the reduction in torque requirements, the hard chrome facing produces a more highly finished face, assuring tighter fit. In addition, the chromium finish eliminates any possibility of tearing the flare face, a condition sometimes experienced with other flaring tools, the company states.

More information? Circle Item 34, postcard, last page.

(Continued on page 114)

Ease of Prefabricating REVERE COPPER WATER TUBE

a big factor in proving copper costs less than rustable material to install



REVERE COPPER WATER TUBE lends itself ideally to sub-assemblies like these. Except for the vent stack the three sub-assemblies shown make up the complete roughing-in for an entire bathroom. Solder fittings assured tight joints when handled and installed. Installation time was saved. Tube supplied by Revere Distributor, CRANE COMPANY, Dallas, Texas.

THE STATLER HILTON HOTEL
Dallas, Texas

IN this newest Dallas hotel there were 60,000 lbs. of Revere Copper Water Tube in diameters ranging from ⅜" to 2½" used for hot and cold water plumbing lines and chilled water lines for air conditioning.

A most interesting feature of this installation was the various sub-assemblies used. (See upper left photo) According to Mr. Brown of the BROWN-OLDS COMPANY, mechanical contractors on the job, "The prefabrication of the sub-assemblies saved many hours of installation time, thus making a copper job cost less than rustable materials to install. But that's only *one* reason we prefer copper water tube. Not only is time saved with the solder fittings used, but you can work in the tight spots without worrying about wrench space. You are always sure of tight joints, and sub-assemblies can't work loose in handling. Then, of course, there is never any corrosion problem, so we always feel confident of doing a good job when we use copper water tube."

These same outstanding characteristics of Revere Copper Water Tube also make it the preferred material for radiant panel heating, underground service lines, drainage, waste and vent lines, oil burner and processing lines.

CHILLED WATER CIRCULATING SYSTEM of Revere Copper Water Tube showing expansion loops and risers which are carried out through the entire periphery of the building. All tube will eventually be insulated as shown. Note absence of joints when easy-to-bend Revere Copper Water Tube is used. It would have been necessary to cut 8 threads and make 8 fittings, in this one set of loops alone, had rustable pipe been used here.

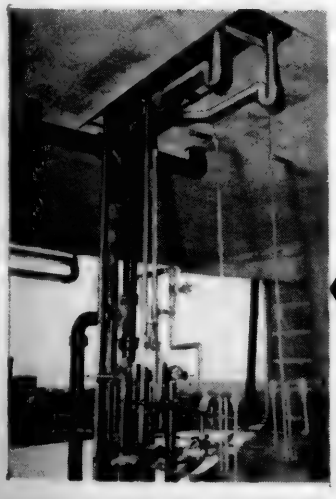


PHOTO SHOWS a complete roughing-in of two abutting baths, together with copper drainage lines from the two bathtubs in the bathroom above. Easier fabrication, less space requirements and the non-rusting qualities of copper are the reasons for using this material for these drainage lines on this job.

REVERE COPPER AND BRASS INCORPORATED
Founded by Paul Revere in 1801
230 Park Avenue, New York 17, N. Y.

Mills: Rome, N. Y.; Baltimore, Md.; Chicago, Clinton and Joliet, Ill.; Detroit, Mich.; Los Angeles and Riverside, Calif.; New Bedford, Mass.; Brooklyn, N. Y.; Newport, Ark.; Ft. Calhoun, Neb. Sales Offices in Principal Cities, Distributors Everywhere.

COPPER ★ BRASS ★ 18 01 ★ REVERE ★ ALUMINUM

(Continued from page 112)

3-Way Solenoid Valves

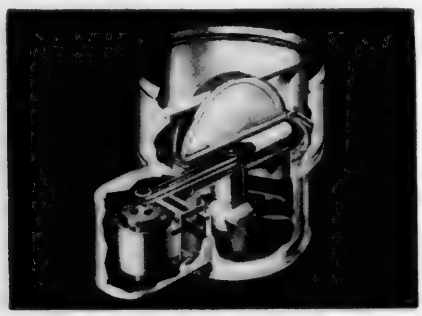
A line of 3-way solenoid valves, known as Series 500, is announced by Jackes-Evans Manufacturing Co., St. Louis, Mo. Especially designed for fan-coil unit control, manufacturer states these valves provide low cost automatic temperature control for year-round air conditioning of multiple rooms or areas. They meet the need for economical three-way control of forced circulation, chilled water air conditioning systems.

The three-way design enables the thermostat to control the flow of water either through the heat exchanger of the fan-coil unit or to bypass the coil. The result is the elimination of pump pressure build-up and resulting fluid shock which sometimes occurs when other types of valves open or close. Low cost is made possible by the elimination of complicated linkage, levers, packing glands or critical tolerances. Other features include durable construction, corrosion resistant materials, low pressure drop requirements, quiet operation and long life.

More information? Circle Item 35, postcard, last page.

Power Roof Ventilator

Wingjet, a new power roof ventilator, has a powerful airfoil-type fan mounted in weatherproof fan casing, according to the manufacturer, L. J. Wing Mfg. Co., Linden, N. J. Covering this are non-chattering, aluminum dampers which are opened immediately by the airstream and held open as long as the fan is operating.



An upper casing or windshield surrounds and protects the dampers and is open at the top, without hood or raincap, for free, direct, maximum exhaust. The jet of air is carried at high velocity far above the roof, preventing vitiated air from damaging roof surfaces, or re-entering the building through fresh air intakes or windows.

While fan is running, rain or snow cannot enter, and when fan is not operating, the dampers close snugly, forming a completely weather-tight closure.

Two types of "Wingjet" Roof Ventilators are available: Type "B" for exhausting hot, corrosive or fume-laden air, has motor located out of the airstream, in a weatherproof housing, driving the fan by means of a V-belt.

In Type "C," for exhausting uncontaminated air, the motor, direct-connected to the fan wheel, is located in the airstream.

Windshield and casing are weatherproof. Motor and other bearings are pre-lubricated.

More information? Circle Item 36, postcard, last page.

Fiber Pipe in 10-Foot Lengths

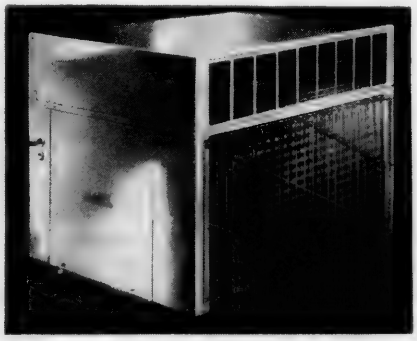
Six-inch bituminized fiber pipe in ten-foot sections, produced by Line Material Industries, McGraw-Edison Co., Milwaukee, Wis., is the newest addition to the company's Permaline pipe family. The ten-foot lengths minimize installation time and expense by reducing the number of pieces to be handled. Thus the economic advantages of using fiber pipe are further enhanced.

The pipe and companion fittings resist absorption of water and chemicals, such as organic acids, alkalis, inorganic salts, organic materials, and wastes. Root-proof fittings, with carefully machined tapers, have smooth inner surfaces that allow high flow capacity.

More information? Circle Item 37, postcard, last page.

4-Ton Remote Condensing Unit

An air cooled remote condensing unit (HSA3-400) has been designed by Lennox Industries, Inc., Marshalltown, Iowa, specifically for jobs requiring four tons of cooling. With 95 deg F air over the condenser, Btu per hr capacities are 48,000 or 41,700 depending upon the size of evaporator unit. A serviceable compressor has been created especially for the 4-ton unit, the company states.



A feature of this condensing unit is its quiet air handling arrangement. In addition, when a special discharge hood is added, condenser air is discharged on the same side of the unit as the air intake. Discharged air is deflected upward so as not to recirculate through the condenser coil. This single-side intake and discharge arrangement permits great flexibility of installation. The unit can even be built into a building, such as a garage, with only the one side exposed to the outdoors, thus overcoming the objection to equipment being located outdoors.

More information? Circle Item 38, postcard, last page.

(Continued on page 116)

Mr. Bors points to one of the many sizes of Glasfloss Filters used at Johnson and Johnson's research center and other plants and offices in New Brunswick, N.J.

"We like the high efficiency and easy handling of Glasfloss Air Filters"

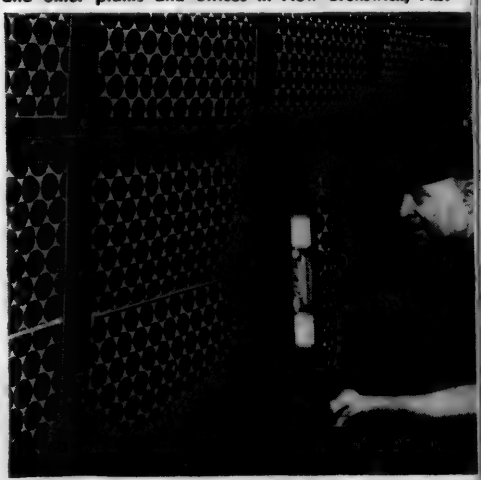
says Mr. Alexander Bors, Maintenance Supervisor at Johnson & Johnson

In the plant offices of Johnson & Johnson, New Brunswick, New Jersey, employees enjoy exceptionally clean, decontaminated air at minimum costs to the company.

Plant personnel state that the highly efficient filtering action and handling ease of Glasfloss Air Filters have made such results possible. Mr. Charles Sutton, field and maintenance engineer, puts it this way. "After three years of Glasfloss, we are convinced that we have obtained the optimum of filter efficiency and ease of handling . . . more than 90% of the contamination is removed by Glasfloss units . . . an obvious improvement over previously used spun glass filters."

Such results have led the company personnel into planning Glasfloss Filtering for a new surgical dressings research and manufacturing plant now under construction.

What's different about Glasfloss that makes such filtering efficiency possible? First, Glasfloss uses only extremely fine, silky glass fibers that are kind to hands and skin. Lighter-to-heavier density of media from front to back stops surface loading, dust and dirt builds up from the inside out. To you, this means Glasfloss catches more dust and dirt, doesn't hamper the flow of cooled or heated air, lowers maintenance costs. Write for complete information on Glasfloss Filters now, ask for Bulletin DF3. Address your request to Glasfloss Dept., Fiber Glass Division, Pittsburgh Plate Glass Company, One Gateway Center, Pittsburgh 22, Pennsylvania.



Over 800 tons of refrigeration supply cold water to 20 individual unit conditioners. All fresh and re-circulated air is filtered by Glasfloss in these units at the total rate of 320,000 cfm.

GLASFLOSS IS A PRODUCT OF THE FIBER GLASS DIVISION OF PITTSBURGH PLATE GLASS COMPANY

Sales Offices are located in the following cities: Charlotte, Chicago, Cincinnati, Cleveland, Detroit, Houston, Los Angeles, New York, Philadelphia and St. Louis

FIBER GLASS

PAINTS • GLASS • CHEMICALS • BRUSHES • PLASTICS

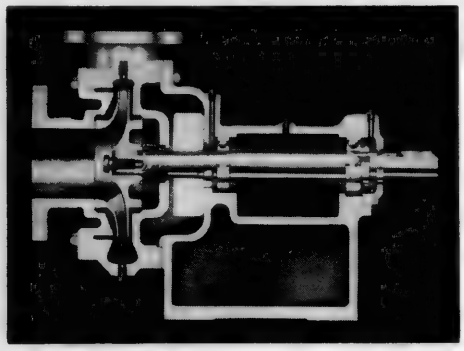
PITTSBURGH PLATE GLASS COMPANY

(Continued from page 114)

High-Speed, High-Head Pumps

A new line of high-speed, high-head centrifugal pumps for general water service is announced by Gardner-Denver Co., Quincy, Ill.

Model BH pumps are available in four sizes—a 1-inch model with capacities to 150 gpm, 1½-inch model with



capacities to 220 gpm, 2-inch model with capacities to 440 gpm, and a 3-inch model with capacities to 520 gpm.

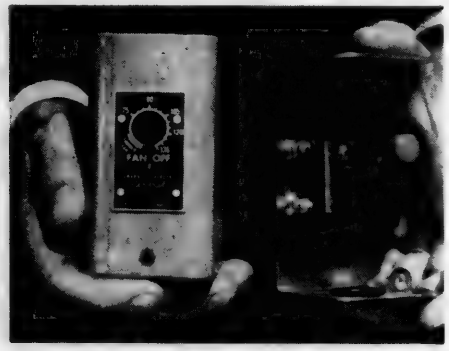
All perform at high efficiency over a wider-than-usual range of service conditions, and offer features of design and material that assure long life, the manufacturer states. Features include stainless steel shafts, oil-lubricated heavy-duty ball bearings, mechanical seals, accurately contoured casings, and hydraulically balanced bronze impellers.

More information? Circle Item 39, postcard, last page.

Fan Switch, 50% Smaller

A fan and limit switch 50% smaller than previous models is developed by Appliance Control Dept., General Electric Co., Schenectady, N. Y., for gas or oil-fired domestic heating systems.

Combined in one enclosure are the necessary components to control the fan or blower operation and also act as a safety limit control. Simple in design, the rugged device is of one-piece construction. Two separate control units mounted in the same enclosure give a wider, faster, and more accurate response than the previous unit for all types of enclosures, according to company engineers.



A captive screw in the cover makes installation fast and easy. Two mounting screws are the only screws needed for mounting the control on a furnace. Exact requirements of furnaces can be met by calibration of the unit at the factory. This provides a permanent setting of the switch, according to the engineers. An adjustable limit knob is also available in addition to the adjustable *fan off* setting.

In winter, the control causes warm air to circulate at the desired plenum temperature and automatically stops circulation before cool air reaches the registers. The unit triggers the fan and warm air is circulated when the bonnet temperature is approximately 20 F higher than the temperature setting indicated on the *fan off* scale. The fan automatically stops when the bonnet temperature falls below this setting. Acting as a safety switch, the warm-air limit unit shuts the burner off before the bonnet temperature exceeds a safe value whatever the cause, according to the engineers.

Switch also has a manual *fan on* position for controlling ventilation in the summer.

More information? Circle Item 40, postcard, last page.

Holds Constant Tank Pressure

Jet Charger, manufactured by Jacuzzi Bros., Richmond, Calif., maintains a constant air cushion in pressure tanks, preventing the water-logging which is a headache to many water pump owners.

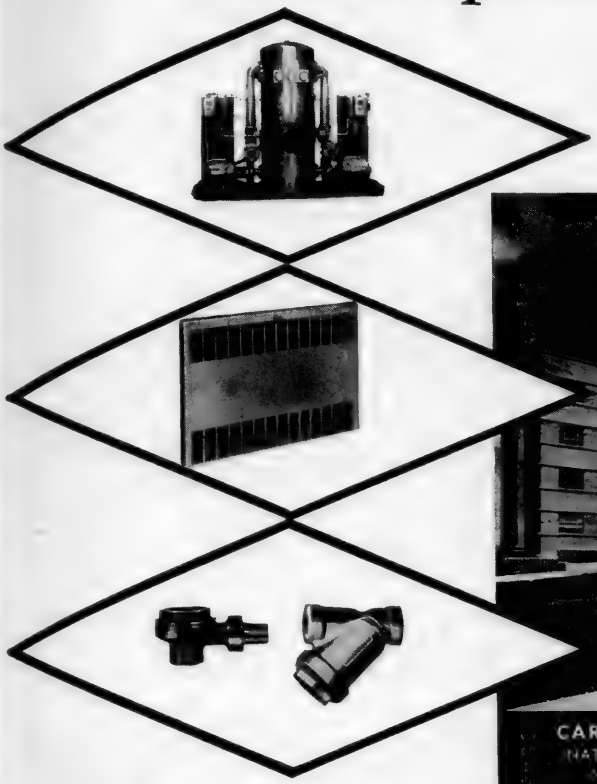
A tough, compact unit with a non-rusting body molded of clear Tenite (Eastman Chemical) butyrate plastic, the unit comes fitted for attachment to tank. A tube from its base connects it directly to the intake of the pump. As air in the tank is absorbed by the water, the charger automatically replaces it. This eliminates frequent starts and stops of the pump motor, reduces pump wear and power consumption.

Designed for use with centrifugal, rotary, gear, deep and shallow well jet, or turbine pumps, it is said to be the most efficient air charger yet built for pressure systems, operating on a pressure differential between pump suction and tank, still, not requiring a vacuum or sub-atmospheric pressure at the pump. It has the further advantage of being easy to check on—the clear butyrate walls make its operation visible.

More information? Circle Item 41, postcard, last page.

(Continued on page 118)

All Pumps, Convectors and Steam Specialties by DUNHAM-BUSH



ON THIS NATKIN & COMPANY HEATING JOB

PUMPS
by Dunham-Bush
VRD65 Duplex Vacuum Pump
VRDA15 Duplex Vacuum Pump
CH2030 Duplex Condensation Pump
CH3030 Duplex Condensation Pump
CH5030 Duplex Condensation Pump

CONVECTORS
by Dunham-Bush
Type 'S' Sloping Top Wall Cabinet Convectors
Type 'R' Recessed Cabinet Convectors
Type 'TOI' Special Panel Convectors

STEAM SPECIALTIES
by Dunham-Bush
'1E' Radiator traps
Float and Thermostatic Traps and Strainers.

Plus Multi-Speed UNIT HEATERS
by Dunham-Bush.

Every day . . . Dunham-Bush "one source—one responsibility" . . . makes more sense to more people who specify and install heating equipment.

At the Cardinal Glennon Memorial Hospital for Children in St. Louis, for example, you'll find *all* pumps, *all* specialties, *all* convectors are by Dunham-Bush.

Let Dunham-Bush assist you in your heating plans. Write for details of our complete heating line.

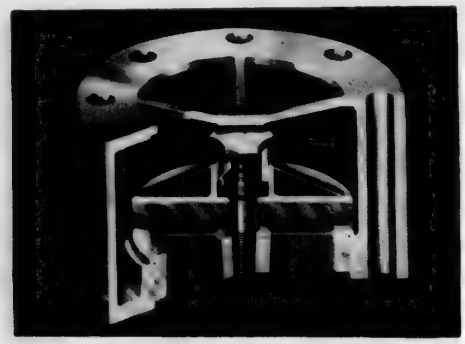
America Looks to DUNHAM-BUSH *for Modern Heating*

DUNHAM-BUSH, INC.
WEST HARTFORD 10, CONNECTICUT, U. S. A.
SALES OFFICES LOCATED IN PRINCIPAL CITIES

(Continued from page 116)

Spring-Loaded Check Valve

Wherever line surges and drop-back present a problem in fluid systems, performance can be substantially improved by its check valves, according to Combination Pump Valve Co., Philadelphia, Pa., manufacturer. Spring-actuated, the internal disc closes immediately as flow ceases and does not depend upon reverse flow for shut-off.



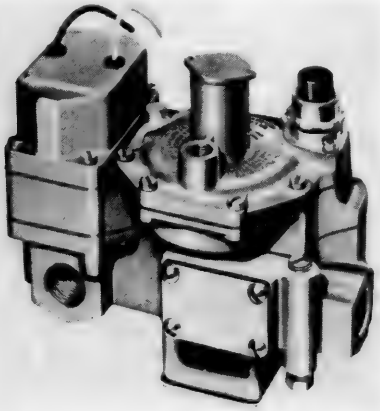
This eliminates damaging surges of fluids, back-drop, and false registry on meters. Also eliminated is the need for air cushions and similar anti-hammer devices. Bearing guides on both sides of the disc and a full flow area that exceeds the pipe area prolongs valve life. Metal-to-metal or plastic-to-metal seating is available. The valve operates in any position.

Standard sizes are from 2 to 18 inches. Pressures range up to 2500 psi. The body and trim are supplied in a variety of metals to meet specific requirements.

More information? Circle Item 42, postcard, last page.

Control for All Gases

A self-contained, silent gas control for large-Btu capacity furnaces is manufactured by A-P Controls, a sales division of Controls Company of America, Milwaukee, Wis. One of a complete line of gas controls, Model 5250 features silent operation, safe lighting, and 100% shut off.



Unit will handle furnaces from 75,000 to 180,000 Btu per hr. It does the job of five individual controls. This eliminates a number of fittings and means less chance for leakage.

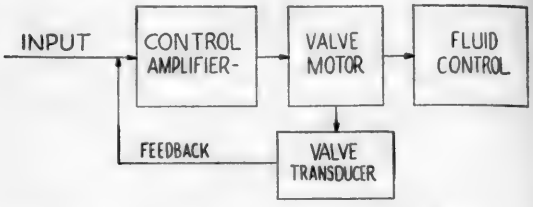
Control may be used with all gases. For summer shut down, it has an interrupter instead of the usual *A* and *B* cocks. The 5250 can be mounted without design changes to any gas-fired unit. It is available in a range of inlet and outlet sizes with right, left or straight through outlets optional. A variety of electric and non-electric operators are available.

More information? Circle Item 43, postcard, last page.

Valve Position Transducer

A recent development at H. E. Sostman & Co., Cranford, N. J., is a valve position transducer for remote indication or control of valve stem or valve position. The output signal may be used with a variety of indicators and recorders or may be utilized as a feedback signal in a servo loop, as illustrated.

Applications for remote valve position indicators are found where safety or product quality depends upon the proper setting or functioning of a control valve. These



transducers produce a signal unaffected by distance from valve to readout instrument. The electric output signal allows a wide choice of readout instruments.

Transducer consists of a finely-wound slidewire and a contacting brush which is positioned by the valve stem via an adjustable connecting link. Noble metal construction minimizes wear. Stem travels 0.25 inch and longer. In ranges from 0.25 to 1.00 inch, sensitivity is .0007 inch; in ranges above 1.00 inch, sensitivity is .001 inch.

More information? Circle Item 44, postcard, last page.

Emergency Damper Opener

The development of a safety vent emergency damper opener, designed as a fire safety factor for modern one story industrial plants utilizing sprinkler systems, is announced by the Chicago Blower Corp., Franklin Park, Ill. The device has been made an integral part of the company's industrial high-velocity power roof ventilator.

The unit, which is completely independent of fan operations, allows smoke and fumes which normally would be trapped to escape, permitting faster access to the area by fire fighters.

The unit is controlled by a single spring, located outside the air stream of the fan, which is held in tension by means of a fusible link. Excessive heat breaks the link, which releases the spring raising the ventilator dampers. The spring on the opener is shielded from flames by the damper blades, the company states, and prevents annealing and loss of tension which is common among ordinary spring devices in flame areas.

More information? Circle Item 45, postcard, last page.

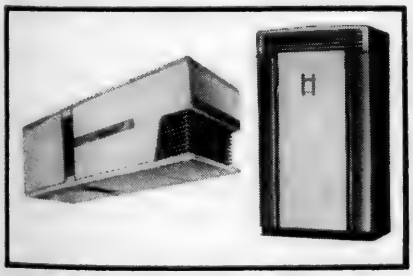
(Continued on page 120)

Air Conditioning *at low cost* in a men's clothing factory, with its many batteries of steaming presses, was considered impractical—until General Electric Zone-by-Zone Air Conditioning solved the problem for H. Daroff & Sons, Philadelphia, manufacturers of Botany "500" and Worsted-Tex clothing. Note that General Electric Ceiling-Mounted Units take no floor space—require little or no ductwork.

General Electric Zone-by-Zone Method

selected for world's first fully air conditioned men's clothing plant

H. Daroff & Sons, Phila., first plant of its type to be fully air conditioned—thanks to General Electric Zone-by-Zone method.



CEILING-MOUNTED UNITS (left). Use no floor space—air-cooled and water-cooled.

FLOOR-MOUNTED UNITS (right). May be stationed in space or away from area served.

The H. Daroff and Sons plant is a typical example of how General Electric Zone-by-Zone Air Conditioning fully meets requirements for any type of factory or office building—even overcomes seemingly insurmountable problems. This system is also a sure way to solve budgeting problems. It is easy to install—no costly interruptions—no major alterations—no heavy initial outlay. Its operation is economical, and it minimizes the problem of space.

More and more architects are specifying General Electric Zone-by-Zone Air Conditioning as the most practical answer for every requirement. General Electric Company, Commercial and Industrial Air Conditioning Dept., 5 Lawrence St., Bloomfield, N. J.

Progress Is Our Most Important Product

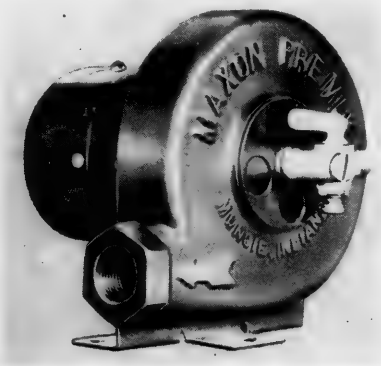
GENERAL ELECTRIC

In Canada, Canadian General Electric Co., Ltd., Montreal

(Continued from page 118)

Gas Burner is Versatile

Designed for small industrial and commercial heating applications and for piloting larger gas burners, the Series M miniature burner manufactured by Maxon Premix Burner Co., Muncie, Ind., has a capacity range of 50,000 to 150,000 Btu per hr.



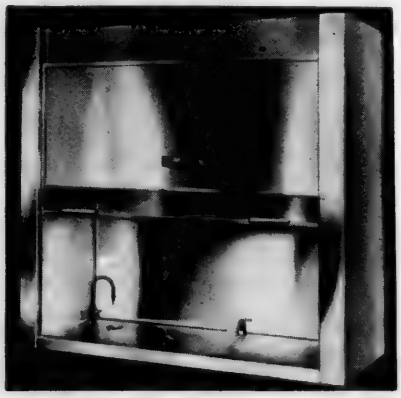
It provides a better quality, more dependable air-gas mixture source, the company states, than atmospheric burners commonly employed in such installations. Firing can be at continuous fixed rate, or automatic on-off control can be used. Any clean fuel gas can be handled.

Like its larger counterparts, the miniature burner is a blower-mixing device which produces an air-gas mixture of pre-determined, adjustable ratio, and delivers it under pressure to a nozzle for ignition.

More information? Circle Item 46, postcard, last page.

Hood with Spherical Corners

A heavy stainless steel fume hood with spherical corners throughout for use in laboratories where hazardous radioactive and perchloric material is involved has been designed by The Warren Corp., Pittsburgh, Pa.



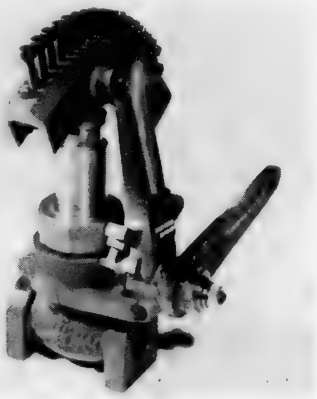
Use of ½-inch radius spherical corners eliminates construction cracks and seams that collect residues of dangerous and corrosive agents. These rounded corners, integrally-welded, are ground smooth and finished to match adjacent surfaces to the working area, and make cleaning positive and easy.

Services of the working surface of the Warco Fume Hood are mounted on raised circular platforms pressed sufficiently high into the stainless steel to prevent chemical and water seepage under the fixtures. A raised front rail along the leading edge of the hood protects against spillage on the front of the hood and down the base cabinet.

More information? Circle Item 47, postcard, last page.

Fuel Oil Control Valve

A redesigned adjustable cam in a lever-operated valve for accurate metering control of fuel oil in industrial oil burner installations is announced by Atlas Valve Co., Newark, N. J.



The valve, Type 235, is designed to control and maintain a certain flow ratio between two variables such as air and fuel oil into an oil-fired boiler. It may be used in applications where the flow of two fluids must be kept within specified ratios such as the control of steam for atomizing fuel oil, the control of steam-driven blowers or stokers, or the control of gas-air ratios to burners.

Valve has a flexible sheet metal cam, the contour of which is adjusted by a series of 24 screws. Cam is attached to a lever which moves it in accordance with a demand motion from the other variable. A roller on the stem presses against the cam and in following the pattern of the cam adjusts flow through the valve.

More information? Circle Item 48, postcard, last page.

Nonmagnetic Thermostat Metal

A nonmagnetic thermostat metal, Truflex S125, has been developed by General Plate Div., Metals & Controls Corp., Attleboro, Mass. Magnetic forces up to 250 oersteds failed to move this material.

In the electrical instrument field where ambient compensation and other thermal functions provided by thermostat metal elements are necessary, Truflex S125 will not be influenced by, and will not cause disturbances in magnetic fields. Regular thermostat metal elements, the company asserts, are sensitive and delicate so that in addition to responding to temperature changes, they are detrimentally influenced by magnetic fields which exist in the instrument.

More information? Circle Item 49, postcard, last page.

(Continued on page 122)

WE'RE **Mighty Proud**

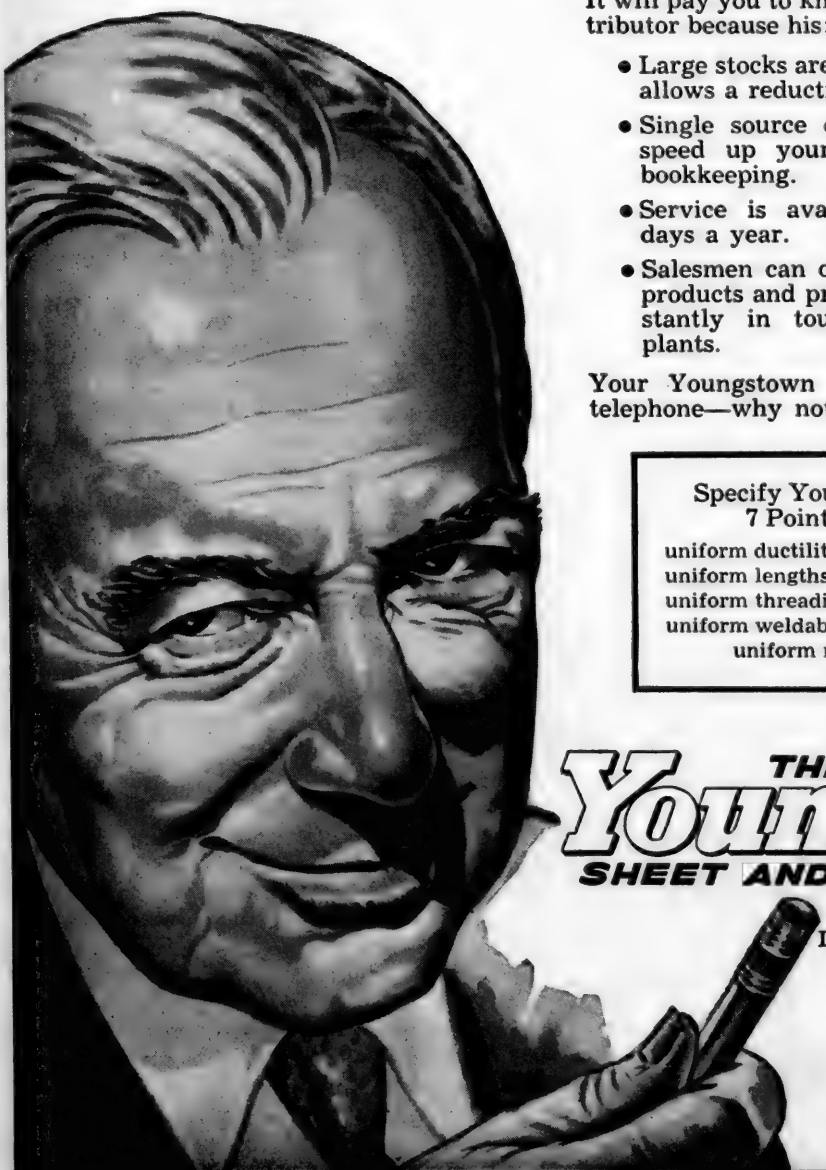
OF YOUNGSTOWN'S DISTRIBUTORS

Youngstown Distributors are in business for only one reason—to quickly supply what you want, when you want it, and in the quantity you require. They provide you the highest quality Youngstown Pipe at the right price—by coordinating their distribution with our mill production. Yes, our hat's really off to these valuable around-the-clock suppliers for the important function they daily perform to industry.

It will pay you to know and use your Youngstown Distributor because his:

- Large stocks are immediately available which allows a reduction in your inventory.
- Single source of supply will simplify and speed up your purchasing, receiving and bookkeeping.
- Service is available around-the-clock, 365 days a year.
- Salesmen can offer valuable information on products and processes because they are constantly in touch with leading industrial plants.

Your Youngstown Distributor is as near as your telephone—why not call him today?



Specify Youngstown and secure these
7 Points of uniform goodness

uniform ductility
uniform lengths
uniform threading
uniform weldability
uniform wall thickness and size
uniform strength and toughness
uniform roundness and straightness

THE Youngstown SHEET AND TUBE COMPANY

General Offices - Youngstown 1, Ohio
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QUALITY YOUNGSTOWN SERVICE

YOUNGSTOWN PIPE

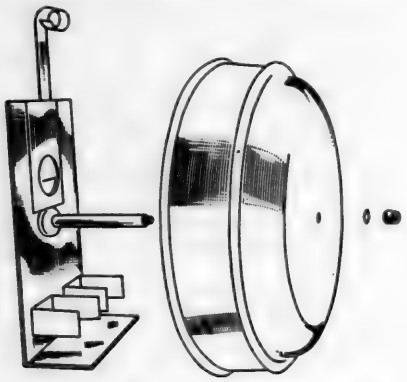
PRODUCERS OF QUALITY CARBON AND ALLOY STEELS FOR OVER HALF-A-CENTURY

(Continued from page 120)

Air Conditioning Deodorant

Claimed to appreciably reduce initial and operating costs of air conditioning equipment by reducing outside air requirements is Big D deodorant and dispenser developed by Le Fevre Chemical Co., Oklahoma City, Okla.

The application of the deodorant in air conditioning systems or self-contained units is said to eliminate odors caused by impurities from the recirculated indoor conditioned air, thus limiting the amount of outdoor unconditioned air to that required for replenishment of oxygen,



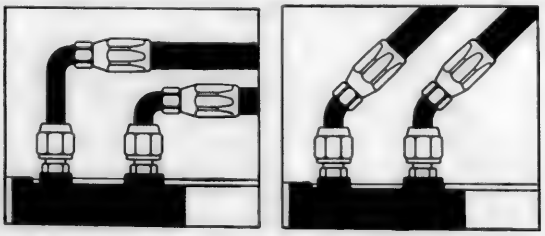
usually obtainable by infiltration. A closed fresh air intake, the company estimates, will increase efficiency of a cooling and heating system from 10 to 30%.

The company's 4-oz deodorant and dispenser are designed for use in any cooling and heating system from 2 to 1500 tons. Each dispenser holds two bottles of the deodorant, and each bottle handles 10 tons or 4000 cfm. There is also available a 1-oz deodorant and dispenser for systems of 2 tons or less. Dispenser unit, shown in exploded view. mounts simply on the outside of the suction side of fan plenum chamber.

More information? Circle Item 50, postcard, last page.

Fittings for Tight Spots

Hose elbow fittings to simplify hose installation in confined spaces and reduce the number of joints and fittings required are developed by Aeroquip Corp., Jackson, Mich. Chief advantages of the fittings are less flow restriction, greater space-saving, and reusability of the fittings. By reducing the number of joints in an installation, possible points of leakage are also eliminated.



Fittings are fabricated from formed tubing and are available in swivel nut ends with JIC and SAE threads. Mating adapters are also supplied for straight gasket seal and pipe threads. All parts are steel.

The elbow fittings are manufactured in 45- and 90-deg configurations, and are designed for use with company's medium and high pressure hose. Both short and extended length elbows are available. Applications include any hydraulic, fuel, air, water, or lubricating oil installation requiring a short radius connection. The swivel fittings tighten without twisting the assembly, and assemblies with double elbow fittings may be angled to the positioning required by the installation.

More information? Circle Item 51, postcard, last page.

Water Heater Saves Space

A 30-gal automatic electric water heater that will fit into areas 20½ inches square and is designed for undercounter or free-standing installation, is being produced by the John Wood Co., Conshohocken, Pa. The heater, designed to meet FHA requirements, has been approved by the Underwriters Laboratories and carries a 10-year guarantee.

Water connections, in the top of the unit and accessible from either side, simplify plumbing connections and enable placement of the heater in any location. It is especially adaptable for home use, low cost apartments and summer cottages but also very applicable for barber shops, beauty shops, service stations, drugstore fountains, and many other spots where space is limited, yet a hot water supply is required.

Galvanized tank is equipped with a 3-section magnesium anode mounted through the front of the heater. The heater also has bimetal surface type thermostat and Nichrome heating elements.

More information? Circle Item 52, postcard, last page.

Reinforced PVC Tubing

A reinforced type of polyvinyl chloride tubing that has been flexed to an angle of 90 deg over 1½-million times without cracking or breaking is available from Newage Industries, Inc., Jenkintown, Pa. The Bardex tubing will bend around a 5/16-inch dia spindle without its internal bore being reduced. Reinforced with a tensile spring, the tubing is virtually uncrushable.

The tubing is completely weatherproof with a working temperature range from —5 to 170 deg F. Material becomes rigid at —50 deg. Working pressures vary from 100 to 200 psi depending upon sizes which range from ⅛ through 1-inch ID.

A descriptive leaflet plus a sample of the reinforced tubing are available from the company.

More information? Circle Item 53, postcard, last page.

(Continued on page 124)

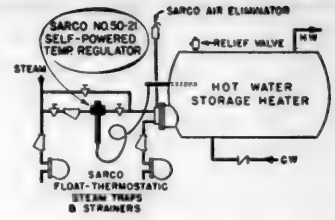
Low-cost Temperature Control — by SARCO

Self-Powered and Electric Indicating

Sarco Temperature Controllers
Self-Powered . . . Fully Modulating

Simple as ABC . . . a thermostat with capillary tubing and a valve. That's all! Operated by liquid expansion. Automatic. Self-powered . . . no electricity or compressed air required. Self-contained . . . no exposed mechanism. Packless valve . . . no stuffing box to leak or stick. Easy to install by any pipefitter.

Furnished with thermostats suitable for any liquid or for air in dryers, ovens, air ducts, etc. Valve sizes . . . ½ to 6". Temperature ranges to 300°F. *Bulletin 620-2.*

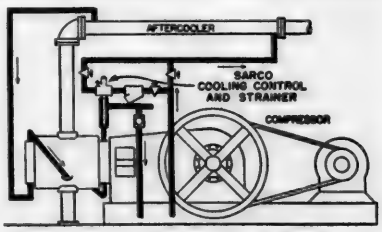


Typical applications: Shell and tube heat exchangers; condensers, oil storage tanks, dryers, etc.

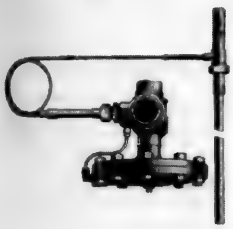
Sarco Cooling Controls
Self-Powered . . . Fully Modulating

Simple, compact, automatic thermostatic valve. Eliminates overcooling and undercooling. Saves water. Overall height of ¾" size is only 17 7/16". Self-powered . . . requires no electrical or compressed air hook-up. Valve and bulb all in one unit. No exposed mechanism. Single-seated packless valve . . . not affected by silt or scale-forming minerals.

Valve sizes . . . ⅜ to 1½". Temperature ranges between 40° and 210°F. *Bulletin No. 710-B.*



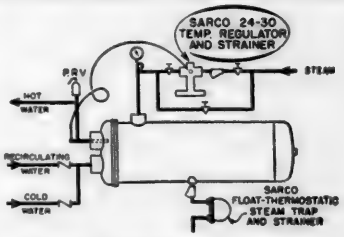
Typical applications: compressors, small engines, water-cooled bearings, condensers, dry cleaning stills, etc.



Sarco Temperature Controllers
Self-Powered . . . Single-Seated, Tight-Closing

A simple, self-powered automatic temperature controller with diaphragm-operated, pilot-controlled valve. Designed for intermittent service or service involving long periods with practically no call for steam. Self-powered by liquid expansion . . . no electricity or compressed air needed. Packless.

Valve sizes . . . ½ to 3". Temperature ranges to 300°F. *Bulletin No. 625-B.*

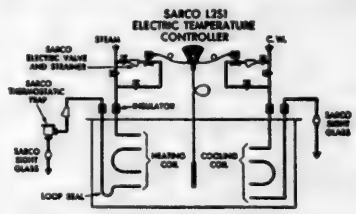


Typical applications: instantaneous heaters, fuel oil pre-heaters, high pressure applications on hot water storage tanks.

Sarco Electric Temperature Controllers
Indicating Type

Simple, inexpensive, electric-indicating automatic temperature controller. Sensitive enough to perform many of the functions of much more elaborate recorder-controllers, at a fraction of their cost. Responds to changes of ± ½°F. Adjustable. Large, easy-to-read scale shows both actual and set temperatures.

Temperature ranges between minus 90° and plus 650°F. Offers many sequence combinations such as step-heating. *Bulletin 1025-B.*



Typical applications: plating tanks, processing vats, kettles, chemical tanks, etc.

Sarcostat Hydraulic Motor Valves
Electrically Operated

For remote control by hand or thermostat. Open and shut operation. Can be equipped with semi-modulating mechanism. Powerful hydraulic action operates valves up to 5" single-seated, or 8" double-seated, at pressures up to 175 psi. Ruggedly constructed . . . to withstand severe use without constant supervision and with minimum maintenance. Operates in any position.

For direct connection to 110 volts A. C., 60 cycle current. Valve sizes . . . ½ to 5" single-seated; ½ to 6" double-seated. *Bulletin 1080-A.*

UNDIVIDED RESPONSIBILITY

From one "Complete Line" source . . . SARCO-SARCOTHERM . . . for temperature controllers, steam traps and other heating specialties.

2230-B

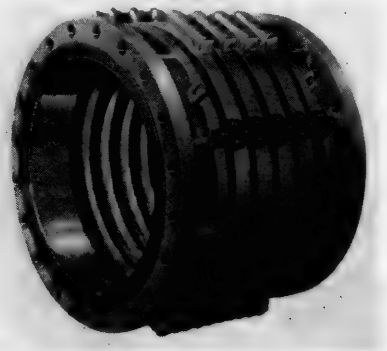
Write for Bulletins to—Sarco Co., Inc., Empire State Bldg., New York 1, N.Y.

For Steam Traps, see Sarco ad, page 109

(Continued from page 122)

Corrugated Expansion Joints

A line of improved corrugated expansion joints in which movement of power and process piping systems is shared equally by all corrugations is available from Zallea Brothers, Wilmington, Del. Called Duo Equalizing expansion joints, these units are used in all-weather outdoor piping systems and for indoor systems operating on frequent on and off cycles to protect piping and related equipment against damage due to temperature change.



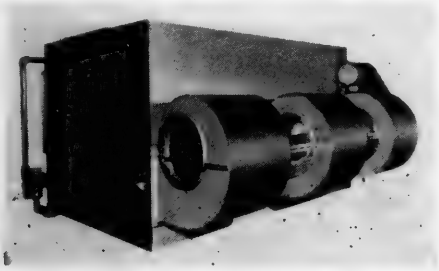
Equal distribution of pipe expansion and contraction to all of the corrugations is accomplished by pantographs, visible in illustration. The pantograph neutrals are anchored to the unit's end fittings and intermediate equalizing rings. Any end fitting movement is immediately transferred by the pantograph to all equalizing rings. This moves all rings the same distance at the same time to give uniform use of all corrugations and prevent undue stress to any one corrugation.

Expansion joints feature four design improvements: (1) 40% longer life than self equalizing expansion joints at the same pressure and movement, (2) 30% less overall length, (3) 30% less weight, and (4) greater stability at high pressures because of the reduced ratio of length to diameter.

More information? Circle Item 54, postcard, last page.

Two Evaporative Condenser Lines

The Vilter Manufacturing Co., Milwaukee, Wis., is offering two new lines of evaporative condensers, the



VXF and the VSC, both suitable for Freon or ammonia.

The VXF condenser, illustrated, is available in capacities of 30 through 300 nominal tons. Since the fan is externally mounted, it does not handle the moist saturated air from the spray chamber. This minimizes corrosion and greatly extends fan life. Servicing of fans and bearings is also facilitated because of the external mounting.

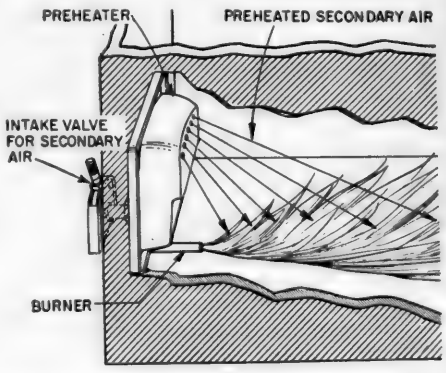
The prime surface condensing coils which are hot dipped galvanized are pitched to facilitate the gravity-flow of the condensed refrigerant to the liquid outlet headers. Coils are staggered for better heat transfer and complete wetting of coil surface. The coils are also spread sufficiently so that the air pressure drop is at a minimum, thus reducing power requirements and keeping noise to a minimum. This condenser is normally used for outdoor service although it can be used indoors with modifications.

In contrast, the VSC is designed primarily for indoor use, although it can be installed outdoors. The model is of the sectional frame type and can be dismantled into three sections for easy indoor placement and simplified erection. The unit is readily adaptable to ductwork and provides a means of ventilating the room in which it is installed. It is available in capacities of 50 through 300 nominal tons.

More information? Circle Item 55, postcard, last page.

Preheater Reduces Fuel Costs

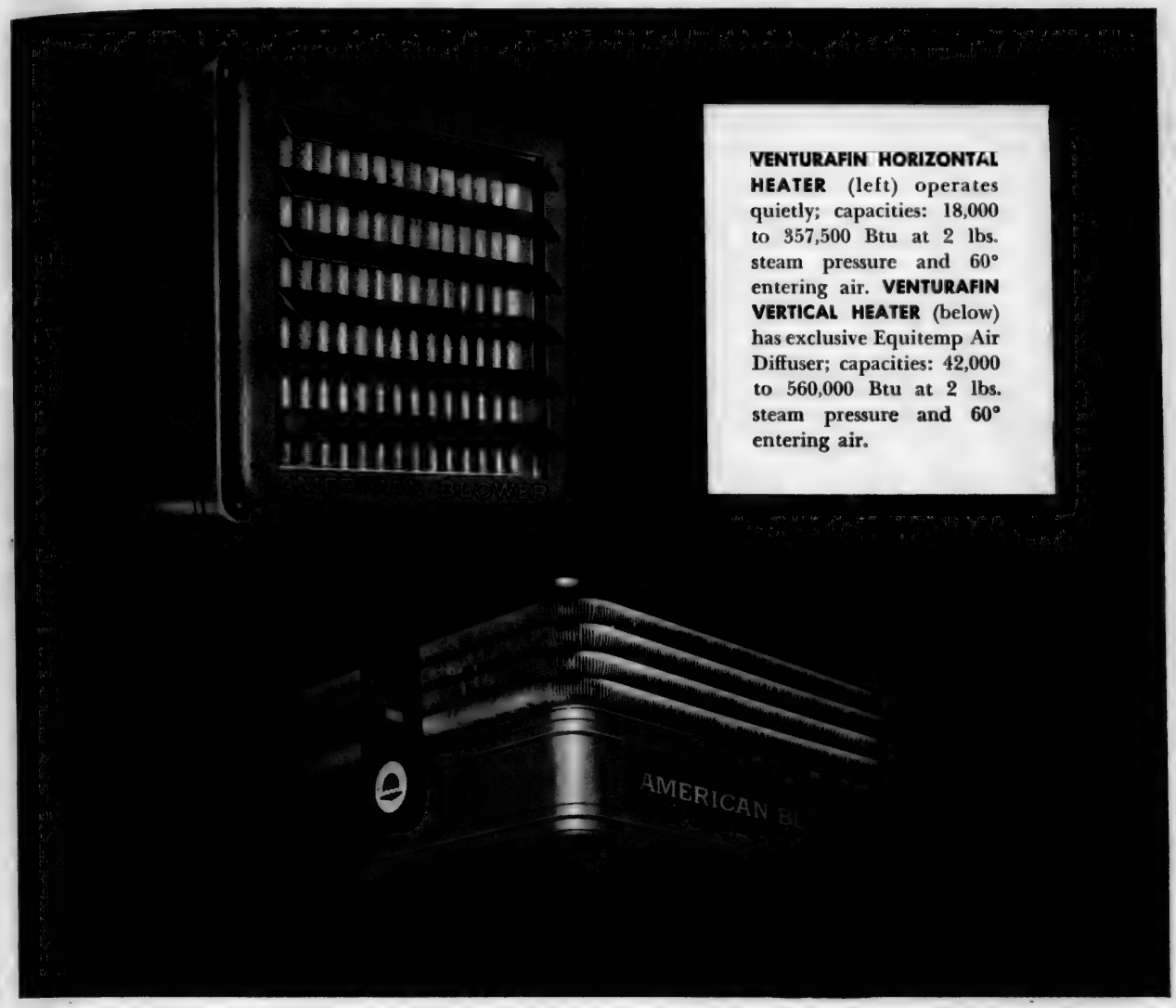
Fuel savings of up to 25% and a marked reduction in smoke and soot are claimed for Boston Air Preheater, recently introduced in the U. S. by The Preheater Corp. of America, New York, N. Y. This low-cost unit, usually installed in boiler fire door, supplies preheated secondary air over the fire bed or burners for maximum combustion of the fuel.



Unit consists of adjustable air intake valve that extends outside of the fire door and a preheating chamber made from a heat-absorbing alloy mounted on the inside of the door. Air is drawn through the intake by normal boiler updraft, circulates through a labyrinth of hot surfaces inside the preheating chamber, and is delivered evenly over the fire bed or burners at a temperature of over 400 deg F. Preheating chamber is heated by radiation that would normally be lost, so it consumes none of the fuel energy usable for operating the boiler.

Preheaters are designed for use with low- and high-pressure, oil, coal, or coke-fired boilers of the induced-draft, forced-draft or steam-blast type. Different models are available for all types of boilers.

More information? Circle Item 56, postcard, last page.



VENTURAFIN HORIZONTAL HEATER (left) operates quietly; capacities: 18,000 to 357,500 Btu at 2 lbs. steam pressure and 60° entering air. **VENTURAFIN VERTICAL HEATER** (below) has exclusive Equitemp Air Diffuser; capacities: 42,000 to 560,000 Btu at 2 lbs. steam pressure and 60° entering air.

Select American Blower Unit Heaters for top quality at competitive prices

Now that American Blower is combining its usual high quality with prices that rank with the lowest, you're 'way ahead when you choose Venturafin Unit Heaters. Sturdy and attractive, they are quiet and built for enduring service.

Available as either vertical or horizontal units, Venturafin Heaters give you your choice of steam or hot-water coils, plus a wide range of sizes and capacities. Fact is, with American Blower Gas-Fired Heaters and Cabinet Heaters, too, you can meet the heating requirements of any job.

So, for top performance on your next heating job, select easy-to-install American Blower Unit Heaters. For more information, contact your nearest distributor, or write us direct today. American Blower Division of American-Standard, Detroit 32, Michigan. In Canada: Canadian Sirocco products, Windsor, Ontario.

AMERICAN BLOWER

Division of AMERICAN-Standard

QUALITY PROTECTS YOUR INVESTMENT...
AMERICAN-Standard QUALITY IS AVAILABLE AT NO EXTRA COST

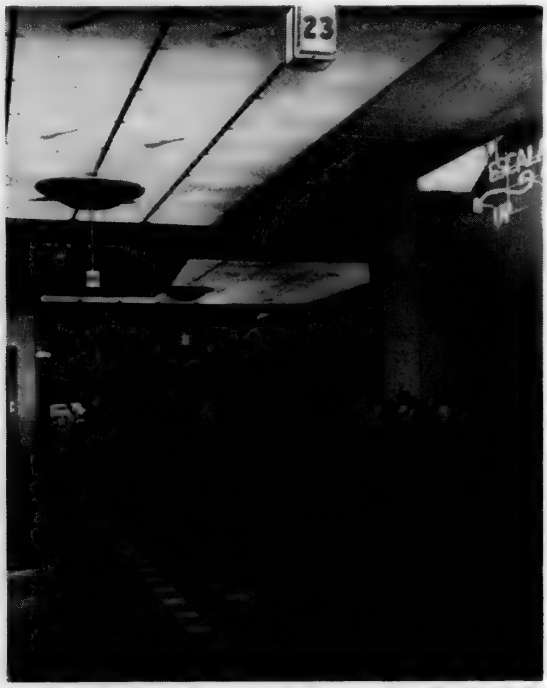
PRODUCT APPLICATIONS

New, Unusual, or Ingenious Uses of Equipment and Materials

Conditioned Gaming Areas in Reno Casino Have Variable Loads, Individual Control

PROBLEM: Harold's Club, Reno's largest casino, posed a difficult cooling problem. Cooling loads are concentrated around crowded gaming tables and shift rapidly from table to table as customers seek to better their fortune in pursuit of Lady Luck. The sensible to latent ratio of the load varies widely as crowds gather and excitement and tension mount. Reno's design temperature is 95 deg F, and crowds often move through Harold's Club at a rate of 19,000 on a week end.

SOLUTION: Response to the constantly shifting loads is provided with a high-velocity, double-duct system equipped with a mixing unit for each table. These are located above the ceiling and discharge through aspirating, ceiling-type diffusers. Proper proportions of cool and warm air are instantly available for each table.



A unique feature of this system is the control for the gaming area. Pendant-mounted directly above each table and beneath the diffusers, as illustrated, controls are located where the load concentration is the greatest and where maximum aspirating effect exists. This assures instantaneous response to the changing conditions.

These controls are the Johnson Service Company's Comfostat, a humidity compensated thermostat, which reduces the dry bulb temperature by an appropriate amount as the humidity increases, thus compensating for the high latent component of the load that exists in those areas to which the crowd moves. Each of 110 diffusers is individually regulated by its own control so that the system is actually zoned for each gaming area.

RESULTS: System flexibility and response provide cooling where and as needed, with a minimum of installed refrigeration capacity. The 400-ton system operates efficiently to control each individual area in accordance with its own requirements.

Fan-Coil Units Handle Heavy Solar Load For Offices on Sealed-Glass Wall

PROBLEM: Enclosed on three sides by other buildings, the new six-story Preferred Insurance Building, Grand Rapids, Mich., presented a design problem, as its only exposed, west wall is designed with a face of hermetically-sealed glass supported by vertical stainless steel ribs to take full advantage of natural light.

Private offices on this western exposure with its high solar gain had to be provided with individual room control on a flexible modular basis. In line with the modular concept to make maximum use of floor space even in the basement, the air conditioning refrigeration equipment had to be relegated to the roof.

SOLUTION: Skidmore, Owings and Merrill, Chicago architect-engineers chose fan-coil units, manufactured by The Trane Co., La Crosse, Wis., for the private offices because duct space for induction units was unavailable. The rest of the building requirements were satisfied by two central fan-coil systems originating in a rooftop equipment room which also houses the refrigeration equipment.

Typical floors are divided into four zones served by an overhead air distribution system. Reheat control is provided year-round for each zone. The units which provide individual control in the private offices are sized to take care of two-thirds of the solar load in that area. The remaining third is satisfied by the central system which also provides all humidification and dehumidification.

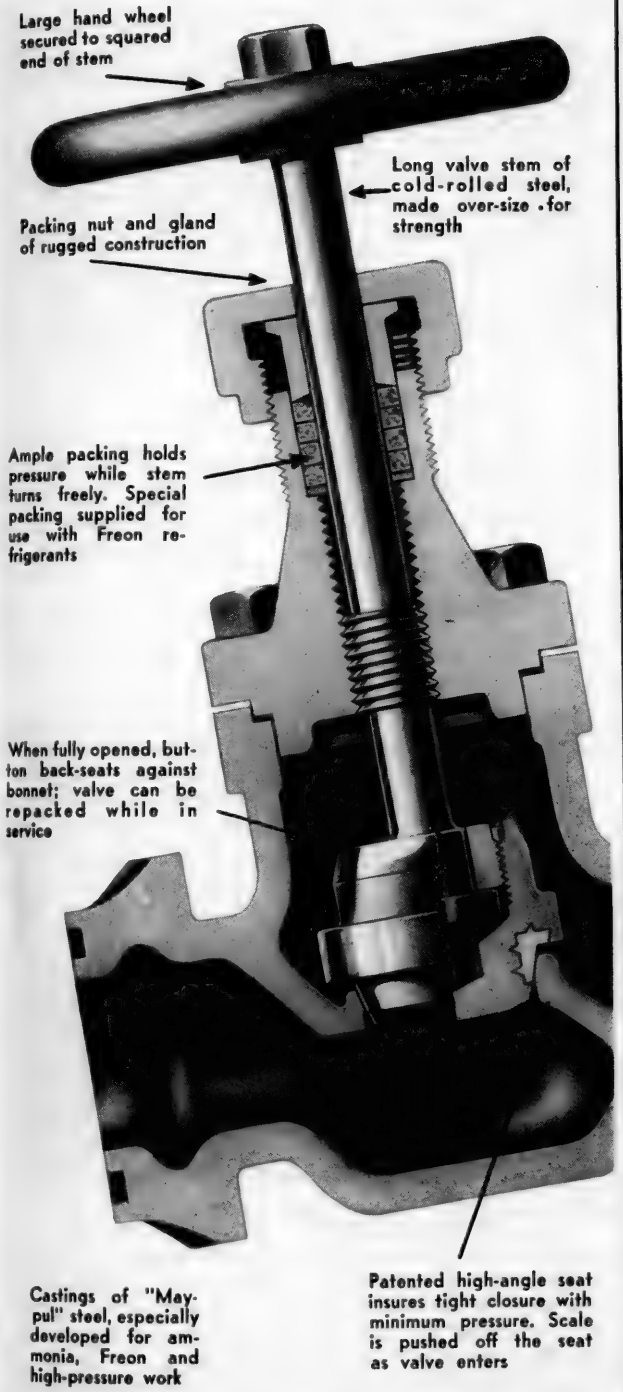
Operating on 100% recirculated air, the fan-coil units are enclosed in a continuous wall-to-wall cabinet which provides storage space on each side and conceals the distribution piping to the coil from vertical risers on each end of the building.

RESULTS: A balanced heating and air conditioning system is installed with the needed flexibility to cope with the external solar load. Trane equipment was installed by Holwerda-Huizinga Co., Grand Rapids; Owens-Ames-Kimball, also of Grand Rapids, was the general contractor.

(Product Applications continued on page 128)

FRICK

Valves are Superior for Refrigeration and Other High-Pressure Services


Large hand wheel secured to squared end of stem
Long valve stem of cold-rolled steel, made over-size for strength
Packing nut and gland of rugged construction
Ample packing holds pressure while stem turns freely. Special packing supplied for use with Freon refrigerants
When fully opened, button back-seats against bonnet; valve can be repacked while in service
Castings of "Maypul" steel, especially developed for ammonia, Freon and high-pressure work
Patented high-angle seat insures tight closure with minimum pressure. Scale is pushed off the seat as valve enters

DEPENDABLE REFRIGERATION SINCE 1882

FRICK CO.

WAYNESBORO, PENNA., U. S. A.

belted and direct-driven

Aerovent type LS 4-blade

industrial fans

Designed for high-volume air movement against resistances ¾" S.P. Featuring new, wider 4-blade "Macheta" Airfoil propellers, "LS" fans are available in ring, duct or square panel types. Standard construction features mean lower initial costs, with more efficient operation. Aerovent "LS" fans are the practical solution to all standard air-moving problems. Special motors, propellers, coatings available for corrosive conditions.

"ls" ring type fans

Available in belted or direct-driven, with ring accurately drilled to facilitate installation. 12" to 48". Capacities to 32,000 CFM.

"ls" square panel fans

Easily mounted in any position with 4 bolts. For air supply or exhaust. Heavy welded-steel construction. High-volume air movement. Sizes 24" to 48".

"ls" duct fans

Designed for use in all standard duct systems. More efficient performance at lower speeds, against static pressures to ¾" S. P. Sizes 24" to 48".

Write for Bulletin 750-A (Belt-Driven) or 775 (Direct-Driven)

Rated in accordance with Standard Test Code and U.S.D.C. Comm. Std. CS178-51.

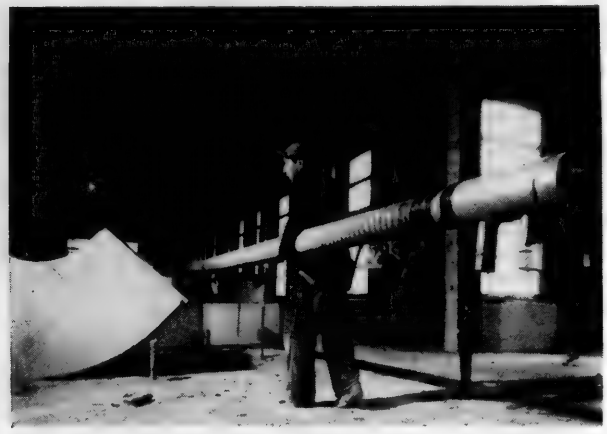
Aerovent FAN CO. INC.

Ash and Brandt Sts. Piqua, Ohio

400 Tons of Sheet Metal Ductwork Carry Comfort in Courthouse

Situated in the heart of downtown Brooklyn is the new Supreme Court Building which is now under construction. When completed, estimated in October, 1958, the $20 million building will rise to a height of 12 stories.

Martin Langberg, president, and Edward Doff, vice president, partners of Alpine Sheet Metal & Ventilating Co., Inc., sub-contractors for all of the sheet metal work, estimated that the building would require approximately 400 tons of sheet metal ductwork for the high



and low pressure air conditioning, heating, and ventilation system. Wheeling Corrugating Company's SofTite galvanized sheets were used for 90% or 365 tons of the $500,000 ductwork installation. A lightweight, high pressure riser section is shown in illustration.

A total of 125 centrifugal fans will be utilized to distribute the cooled and heated air to all floors and offices. Two Worthington compressors, each direct-connected to a steam turbine, supply a total of 245 tons of refrigeration.

General contractors for the new building are Castagna & Sons, Inc., and HRH Construction Corporation. Heating and air conditioning went to Heating Maintenance Corporation as the prime contractor and to Alpine Sheet & Ventilating Company, Inc., as sub-contractor. General architects are Shreve, Lamb & Harmon; and mechanical engineers are Syska & Hennessy.

Hospitals Apply Electronic Air Cleaners to Control Air-Borne Viruses

Automatic units that electronically clean the air will soon be installed in the Mountainside Hospital of Montclair, N. J., and the West Hudson Hospital of Kearny, N. J. The electronic filters, to be incorporated in the air conditioning systems, are designed to remove 90% of all dust particles in the air. The units clean air by delivering 13,000-volt knockout punches to tiny air-borne particles.

"Air and water are basic elements of life," explains William Guy, engineering officer at Mountainside Hospital. "Science has done much with wonder drugs to relieve and cure persons afflicted with virus infections and allergies. But complete control means the elimination of viruses and other disease-producing organisms from air as they have been eliminated from water."

Engineers of Minneapolis-Honeywell, manufacturer of the systems, explain that the average person takes in about one teaspoonful of dust in his lungs each day and that this dust carries allergies, viruses, bacteria, hydrocarbons and eye, ear and respiratory irritants. Ralph Pocaro, engineer in the company's New Jersey office, says airborne particles with the greatest staining power are those that are too small to be removed effectively by ordinary mechanical filters. These particles are less than a 5,000th of an inch in size.

Monsen Refrigeration Co., Bloomfield, N. J., is installing the Mountainside air cleaner as part of the program to modernize the hospital's maternity wing. The West Hudson unit will be placed in the air conditioning system for the operating room.

Unheated Buildings Made Comfortable By Portable Electric Heating Plant

The problem of making sections of unheated buildings comfortable enough for maintenance crews has been solved electrically at a northern New York plant. The answer is a portable heating plant consisting of a 4-caster dolly on which are mounted a Chromalox fan-type electric heater and controls. Sixteen of the units,

one of which is illustrated, are now in use and are plugged into outlets throughout the buildings as needed.

Components mounted on the dolly are the electric heater, Model UB-2001 rated at 460 volts, 3 phase, 20 kw, 60 cycle; a magnetic contactor; a stepdown transformer to provide 115 volts for the air heater motor and magnetic contactor holding coil. Heater is controlled by an on-off switch.

Fabrication was performed by Roemac Industrial Sales Co., Buffalo, N. Y., for Niagara Electric Sales Co., sales and engineering representatives in Buffalo for Edwin L. Wiegand Company, Pittsburgh, Pa.

THE WORLD'S MOST EFFICIENT POWER EXHAUSTER

...for industry... for institutions... for residences

★ NO MOTORS, FANS OR BEARINGS IN EXHAUST LINE
★ NEEDS NO STACKS ★ ACID RESISTING VITREOUS ENAMEL FINISH

FOR INDUSTRY, Quickdraft excels in venting paint booths . . . abrasives . . . corrosive gases . . . noxious fumes . . . high temperatures and moisture. Its blower operates in clean or outside air. It eliminates down-time for cleaning and replacing fan blades. It improves industrial venting and reduces maintenance costs!

FOR INSTITUTIONAL AND COMMERCIAL BUILDINGS, Quickdraft efficiently vents heating plants, water heaters and incinerators at roof level. It saves the cost of building unsightly tall stacks.

FOR RESIDENCES, Quickdraft makes low, cold and erratic chimneys function. On and off with the fire, Quickdraft maintains constant draft required for efficient and economical combustion of all fuels. It eliminates pulsating or chattering, puffing, smoking and sooting.

SEND FOR QUICKDRAFT ENGINEERING DATA ON YOUR VENTING OR HEATING APPLICATIONS . . . TODAY.

IMPORTANT NOTICE

In addition to standard acid resisting vitreous enamel finish, all Quickdraft units are available in No. 316 Stainless Steel or in rigid Polyvinyl Chloride for withstanding highly corrosive gases. With static pressures up to 12-inches, Quickdraft is ideal for materials handling applications.

THE *Quickdraft* CORPORATION
P. O. Box 87-O • Canton 1, Ohio

N-558-QD

Leading engineer-constructor selects

CARRIER HEAT DIFFUSERS

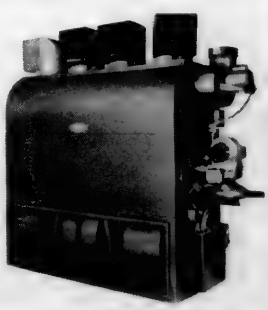
...for own building

Luria Engineering Company knows heating efficiency. To heat the two million cubic feet of storage and production space in its Chicago plant, Luria chose six 46AF Carrier Heat Diffusers—each with one million BTU output.

Compact Carrier Direct Fired Heat Diffusers are completely self-contained. Stainless-steel combustion chamber, burner, heat interchanger, air handling equipment, and controls are all in a single casing. They cut heating costs three ways: 1. Cost less to own because they do the job of several smaller units. 2. Cost less to install because no central boiler is required. 3. Cost less to operate because of high efficiency.

Amazingly versatile, they can be floor mounted, ceiling mounted, wall mounted, or installed with ducts—installed vertically, horizontally, upside down. Available for all types of fuel combinations. 10 sizes, 300,000 to 2,000,000 BTU's. Carrier has heaters for all applications; call the Carrier Manufacturer's Agent listed in your Classified Telephone Directory under "Heaters—Unit." Or write Carrier Corporation, Department UH, Syracuse, N. Y.

- combustion chamber is 309 stainless steel
- cylindrical chamber for quiet combustion
- non-clogging, long-life exchanger tubes
- forward curve fan blade, powerful diffusion
- steel cabinet finished in durable baked enamel
- fiberglass insulation to keep panels cool
- pre-wired, factory-fired before shipment



Carrier

industrial heating
air conditioning
refrigeration

NEWS OF THE MONTH

FUNCTIONAL DRAFTING

one-day seminars will cover advanced techniques developed and applied by Westinghouse experts.

Industrial Education Institute, in cooperation with leading professional societies, trade associations, and industrial publications, will sponsor a series of one-day seminars in four major cities on advanced techniques in functional drafting. The seminars will be conducted by a panel of Westinghouse Electric Corporation experts who have actually developed, applied, and taught these techniques throughout their company.

• **NEW METHODS**—While programs will include a brief review of such practices that have proven of great value in actual use, the sessions are primarily designed to present other new and advanced techniques, methods, systems, and procedures.

An explanation of the origin, development, and advantages will be presented with each technique, followed by a demonstration and explanation of how each technique is being successfully applied.

Topics included in the program are: 1) Organizing and applying a simplified drafting practices program; 2) Successful application of advanced functional drafting techniques; 3) Producing drawings photographically; 4) Making printed circuit drawings; 5) A practical system of identifying parts and drawings; 6) Reducing storage space of old original tracings; 7) The lineless diagram technique; and 8) Producing drawings by computer.

• **NOTES SUPPLIED**—Those who attend the seminar will be well equipped with notes and reference material to teach their associates the latest developments in drafting room techniques.

The seminar will open in Cleveland on September 24, be in New York on October 2, and will tentatively conclude in Baltimore and Chicago on October 29 and 31, respectively. The registration fee, which includes all expenses during the day is $35. Applications and additional information can be obtained from Industrial Education Institute, 25 Huntington Ave., Boston 16, Mass.

NEW RADIANT GROUP

formed in Los Angeles, Calif. Members are licensed radiant heating contractors and engineers.

Formation of Radiant Heating and Cooling Institute is announced by George Rusher, president of the group. With a membership composed of licensed radiant heating contractors and engineers, the Institute will offer information and assistance to architects, builders and affiliated groups in the construction field.

A further purpose of the Institute is to make the general public more conscious and aware of the advantages of radiant heating and cooling installations. Other Institute officers are Harry W. Taylor, vice president; Leroy C. Bishop, secretary; and Don Smith, treasurer.

The Institute is located in Suite 318, 5657 Wilshire Boulevard, Los Angeles 36.

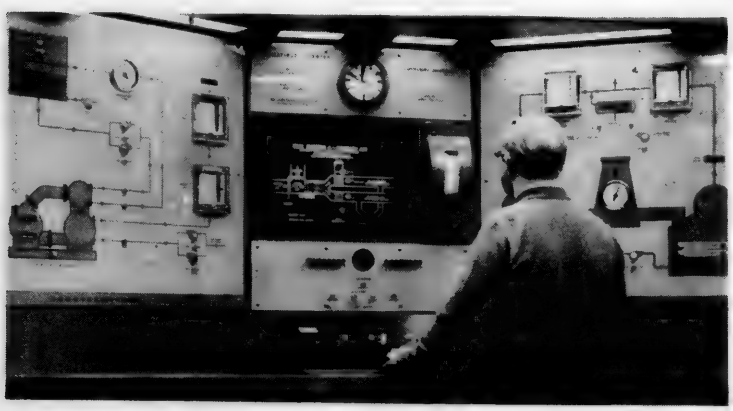
TENANT GRIPES

while office building is being air conditioned, forestalled by informative booklet distributed by management.

Rather than wait till the appearance of gaping holes in wall and construction equipment in corridors brought forth a deluge of questions and complaints, Robert E. Sheehan, manager of Los Angeles' Pacific Mutual Building has beaten trouble to the punch. As installation of its $1,250,000 year-round air-conditioning system was just getting underway, tenants, their employees, and some 1,000 Pacific Mutual home office employees arrived to find on their desks a handsomely decorated brochure announcing and explaining the new air conditioning plan. One of the illustrations is shown.

The folder explains in easily understandable terms what new air conditioning will do, how it will look, how long it takes to install, and answers a multitude of other questions of interest to those working in the building.

(Continued on page 146)



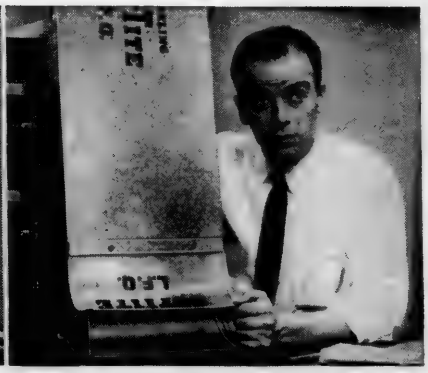
SLIDE PROJECTOR

Eight ft console control panel by Minneapolis-Honeywell will give building engineer push-button control over entire heating and cooling system in skyscraper of the future. In the center of this working model is slide screen which projects fan system layout and floor plan of any temperature zone in the building.

The few pushbuttons control only the functions visualized on the screen. Other control functions which may be located on panel include wind direction and velocity indicators, sun intensity meters, and plumbing systems.

"We can make the most severe operations . . .

and the tightest joints and locks . . .



without fear of the zinc coat cracking because . . .

Wheeling SOFTITE has the tightest zinc coating yet produced"

Air conditioning engineers and sheet metal fabricators are discovering untold new economies using Wheeling SOFTITE Galvanized Sheets.

For one thing, here is a sheet that really *likes* to be worked. It's soft and ductile, easy to form, easy to crimp. But more, SOFTITE has a tight zinc coating that's almost impossible to chip or flake no matter how severely it is fabricated.

And so Wheeling SOFTITE lasts far longer. Likewise ducts made of SOFTITE.

If you are not getting performance like this from your present galvanized sheet, or if you are using ordinary steel sheets for fear that a galvanized sheet can't take the strain, Wheeling SOFTITE may be your answer.

Call your Wheeling industrial supply distributor, the Wheeling sales office nearest you, or write Wheeling Steel Corporation, Wheeling, West Virginia.

IT'S WHEELING STEEL

WHEELING STEEL

DISTRICT SALES OFFICES—Atlanta, Boston, Buffalo, Chicago, Cincinnati, Cleveland, Detroit, Houston, New York, Philadelphia, St. Louis, San Francisco, Wheeling

OUR CHALLENGE STANDS: ANYTHING THAT CAN BE MADE OF STEEL SHEETS CAN BE MADE OF WHEELING SOFTITE GALVANIZED SHEETS

NOW YOU CAN OMIT TALL, UNSIGHTLY, UNNECESSARY CHIMNEYS FROM MODERN SCHOOL DESIGN

Wing

DRAFT INDUCERS

PROVIDE POSITIVE, UNIFORM, ADEQUATE DRAFT AT ALL TIMES

Architects find that "blending" a tall chimney into a low, modern, functional school design is an unworthy compromise. Actually such compromise is unnecessary, for there is no need today for an unsightly chimney. Wing Motorized Draft Inducers provide positive, uniform, adequate draft for boilers or furnaces . . . completely independent of weather conditions. In addition, they save money through higher fuel burning efficiencies. Easily installed in the flue or breeching, Wing Draft Inducers require only enough chimney to vent the exhaust gases. Write for bulletin and special information on school applications.

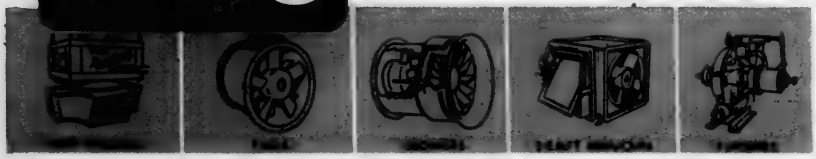
In confirmation of the above, there are over 500 Wing Draft Inducer installations in schools alone, in all parts of the country, with hundreds more being specified by architects and engineers as the great school building program continues.

L. J. Wing Mfg. Co.
Division of Aero Supply Mfg. Co. Inc.
Factories: Linden, N. J. and Montreal, Can.

158 Vreeland Mills Road,
Linden, New Jersey

L. J. Wing Mfg. Co., Linden, New Jersey AC-9
Please send me Bulletin SCH-1—Draft Inducers
Name.....
Firm.....
Address.....
City.....Zone.....State.....

Wing



NEW CATALOGS

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

PACKAGED BLOWER UNITS—A 52-page illustrated catalog (Bulletin 8314) describing the company's line of Sirocco Utility Sets is available from American Blower Division of American-Standard, Detroit, Mich. The new catalog illustrates and describes the various size ranges and configurations of fan wheels and motors available. Features and advantages of the units are explained and illustrated.

Circle **Item 57** on Inquiry Card

HIGH TEMPERATURE HOT WATER—To help in the selection and application of the company's controls for high temperature hot water installations, a 4-page engineering folder has been published by McDonnell & Miller, Inc., Chicago, Ill. This folder employs diagrams liberally to show how the company's pump controls, water feeders and relief valves are used in high temperature systems; it also contains brief selection tables.

Circle **Item 58** on Inquiry Card

FLEXIBLE HOSES AND DUCTS—Offered by The Flexaust Company, New York, N. Y., is 8-page Bulletin No. 70. Tabbed for easy reference, the bulletin presents prices, sizes, and complete information on the company's lines of flexible hose and duct products.

Circle **Item 59** on Inquiry Card

HEAVY DUTY GAS THERMOSTAT—A heavy duty, high capacity gas thermostat for use in commercial and industrial equipment is described in a new bulletin, RT-815, offered by Robertshaw-Fulton Controls Co., Greensburg, Pa. Model CTS thermostat is of the snap-acting type and is available in temperature ranges to 550 deg F. It is designed for use where quick response to temperature changes is required. In the ¾-inch size, it is rated at 133,700 Btu per hr for manufactured gas, 198,000 for natural gas, and 422,000 for LP-gas.

Circle **Item 60** on Inquiry Card

WET-TYPE DUST COLLECTOR — A product bulletin, No. 274B, describing the Type W Roto-Clone, a dynamic precipitator, is released by American Air Filter Co., Inc., Louisville, Ky. The 16-page bulletin discusses the operation of the dust collector in detail, including various arrangements. The bulletin explains the device's distinguishing feature, which is the addition of a water spray to the basic principle of dynamic precipitation. Other features of the bulletin include wiring diagrams, 23 performance tables, exploded view of the shaft assembly, engineering data, pipe resistance chart, and erection diagrams.

Circle **Item 61** on Inquiry Card

(Continued on page 134)

Architect and Engineers:
LOCKWOOD GREENE ENGINEERS, Inc., New York, N. Y.

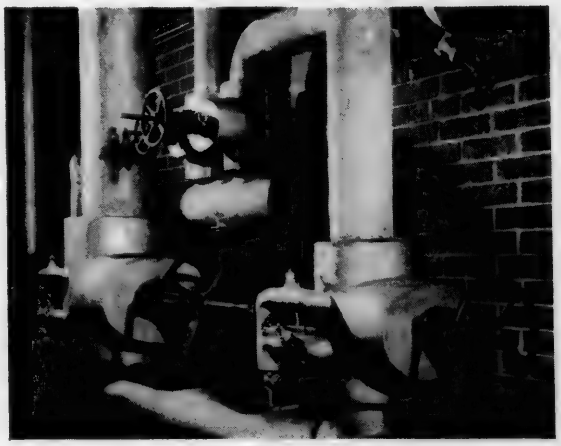
General Contractor:
DANIEL CONSTRUCTION COMPANY, Greenville, S. C.

Textron's first fully integrated woolen mill is equipped with **JENKINS VALVES**

The nation's largest woolen mill, with weaving, dyeing and finishing facilities all under one roof, occupies 430,000 square feet at Barnwell, S. C. This huge plant, operated by Amerotron Corporation, a Textron company, contains the most modern equipment that textile technology and modern engineering could provide. Utilizing U-shaped production flow, the Barnwell Mill achieves the utmost in economy of movement and handling of raw and finished materials.

The equipment for this ultra-modern, air conditioned plant was selected to match the efficiency and advanced concept of the building design. To control much of the complex piping system, Jenkins Valves were the unanimous choice of Textron's management and the engineers and contractor involved in this project.

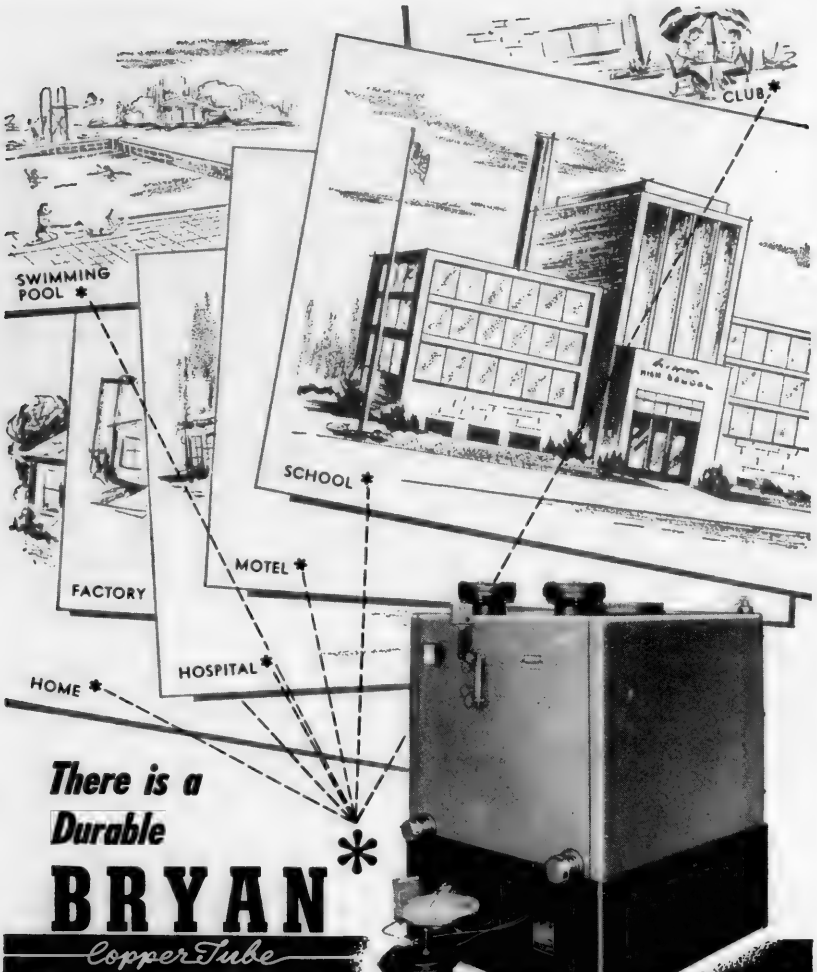
Expectation of an extra measure of performance and economic service from Jenkins Valves has been universal among building experts and plant operating personnel for three generations. The symbol of this reputation is the famous Jenkins' Diamond and Signature trade-mark . . . and, moreover, the valves that bear this famous name *cost no more*. Jenkins Bros., 100 Park Ave., New York 17.



Example of the wide variety of sizes and types of Jenkins Valves required to control the complex piping system of Textron's new Barnwell Mill.

JENKINS
LOOK FOR THE JENKINS DIAMOND
VALVES
TRADE JENKINS MARK SINCE 1864
Jenkins Bros.

Sold Through Leading Distributors Everywhere



There is a Durable

BRYAN

Copper Tube

BOILER

For every steam or water heating application up to 1,800,000 B.T.U. output.

Whether the plans on your boards are for a factory, apartment house, swimming pool or a modest radiant heat home, a detailed check on specifications will point to one of the many Bryan models covering low or high pressure steam, hot water boilers, or indirect water heaters.

The Bryan is a heavy duty, durable boiler made to deliver a lot of B.T.U's in a short period of time. Specially engineered for gas or oil heating, its high efficiency is complemented by years of trouble free service. Requires minimum floor space.

Bryan is the originator of the famous Bryan copper tubes. They are used in both direct and indirect heating units for fast action and elimination of scale deposits.

Bryan Gas Fired Boilers are designed and built to the requirements of the A.S.M.E. code and are also approved by the American Gas Association (A.G.A.)

Send For Technical Information • 2100 Chili Pike

BRYAN STEAM CORPORATION • Peru, Indiana

NEW CATALOGS

(Continued from page 132)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

AIR HANDLING PRODUCTS—Available from Air Devices Inc., New York, N. Y., is a 4-page bulletin, No. TA-100, describing the company's Thermotank and Agitair lines, now linked together to provide an extensive selection of quality air handling products for air conditioning, heating, and ventilating applications.

Circle **Item 62** on Inquiry Card

ARC AND TORCH WELDING—Two new 2-color wall charts, T-IS-2690 and T-IS-2689, designed for technical schools and plant training programs in the practical aspects of torch and arc welding, are available from Eutectic Welding Alloys Corp., Flushing, N. Y. Each chart, measuring 22 by 34 inches, is designed to fit into welding training programs by providing students with graphically clear illustrations of correct arc and torch welding procedures.

Circle **Item 63** on Inquiry Card

PACKAGED WATER CHILLERS—Literature highlighting the company's Model CWG-E packaged water chillers with built-in evaporative condensers is released from Drayer-Hanson, Div. of National-U. S. Radiator Corp., Los Angeles, Calif. Product photos and a series of dimension and performance charts for easy specifying of 8 models, in sizes from 7½ to 75 hp, are included in the 20-page publication, designated No. EMT-5715EC.

Circle **Item 64** on Inquiry Card

BENDING PIPE AND TUBING—Engineers, designers, and others involved in the fabrication of pipe and tubing will be interested in Bulletin TDC-187 released by Tubular Products Div., The Babcock & Wilcox Co., Beaver Falls, Pa. This six-page folder describes the various methods of bending pipe and tubing and supplies helpful hints which will overcome many of the fabricator's bending problems.

Circle **Item 65** on Inquiry Card

REFRIGERATION EQUIPMENT—Madden Brass Products Co., Aurora, Ill., has released their new 24-page refrigeration and air conditioning catalog, No. R-657, showing or listing over 600 items and containing the company's policies and conditions of sale. Attractively printed in two colors, the catalog, covering such items as charging lines, hermetic port valves and refrigerant dispensing kits, also shows and describes flare fittings, strainers and driers, capillary tube, tube working tools, and brass pipe fittings.

Circle **Item 66** on Inquiry Card

GENERAL SERVICE PUMPS—A four-page, two-color catalog, No. D-100, describing four different types of general service pumps is available from Economy Pump Div., C. H. Wheeler Mfg. Co., Philadelphia, Pa. These pumps are designed for hot and cold water and brine circulation, air conditioning systems, sprinkler systems, and boiler feeding. Mechanical features are fully described and illustrated. Performance data and sizes are listed, and material specifications are included in the catalog.

Circle **Item 67** on Inquiry Card

PACKAGED AUTOMATIC BOILERS—A 24-page illustrated bulletin, No. 1245, describing Powermaster packaged automatic boilers, is available from Orr & Sembower, Inc., Reading, Pa. Available in sizes ranging from 40 to 500 hp, the entire unit is designed, constructed, fire tested, insulated, and guaranteed by the manufacturer. This 4-color bulletin provides detailed illustrations of both oil and gas fired units, plus illustrations and explanations of the boiler components.

Circle **Item 68** on Inquiry Card

GASKETS, BACK-UP RINGS — A complete line of gaskets, back-up rings and O-rings that are impervious to the most destructive acids, alkalis, corrosives, and solvents, at temperatures from —120 to +500 deg F, are described in Bulletin No. P-327, published by Crane Packing Co., Morton Grove, Ill. Information includes service and mechanical recommendations, data on operating pressures and standard sizes as well as dimensional details.

Circle **Item 69** on Inquiry Card

STEAM SPECIALTIES—Strong Steam Specialties Div., Strong, Carlisle & Hammond, Cleveland, Ohio, has released a new catalog of its entire line. Entitled Steam Specialties, this 60-page catalog contains complete descriptions, illustrations, dimensions, capacities and prices of the company's line, including steam traps, strainers, separators, flash separators, and reducing valves. Condensed tables comprise the most complete, concise presentation of steam trap pressures, capacities and orifice sizes found in any catalog or handbook.

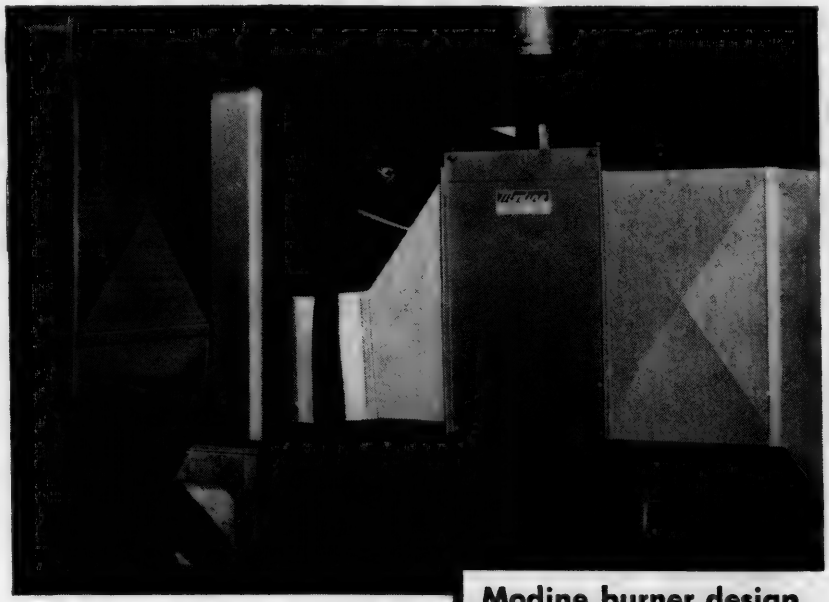
Circle **Item 70** on Inquiry Card

EXTENDING COOLING TOWER LIFE—Application Engineering Data Sheet, D-57-1, is published by Milton Roy Company, Philadelphia, Pa. This four-page data sheet describes several methods of combating corrosion and delignification in cooling towers, using controlled volume pumps to meter precise quantities of chemicals to cooling water. This data sheet features complete details and drawings explaining continuous pH control using the company's Mersemetric pumps, acid metered in proportion to flow rate, chemical feed with automatic level control, and other low-cost cooling tower water treating systems.

Circle **Item 71** on Inquiry Card

(Continued on page 136)

Never rusts or corrodes, offers amazing installation flexibility



Modine stainless steel gas-fired duct furnace

This versatile furnace is especially suitable for use with cooling coils and packaged air conditioners. Stainless steel burners and heat exchangers prevent the rust and corrosion problems of conventional units. What's more, compactness and light weight allow easy, low-cost shipping and installation.

Check these Modine PLUS features

Fast, uniform heat is assured by direct firing of each seam-welded, gas-tight heat exchanger tube.

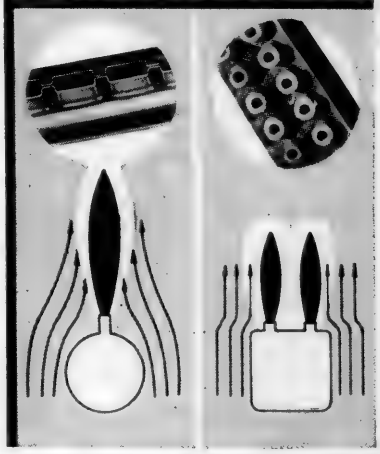
Convenient controls are mounted on side of unit for easy access regardless of furnace location.

Removable burner permits easy inspection and maintenance.

Five sizes are available from 88,000 to 213,000 Btu/hr input.

Wide application — Ideal as central heaters . . . boosters . . . with air conditioners . . and for industrial and agricultural drying, processing and ventilating.

Modine burner design prevents clogging . . . assures clean burning



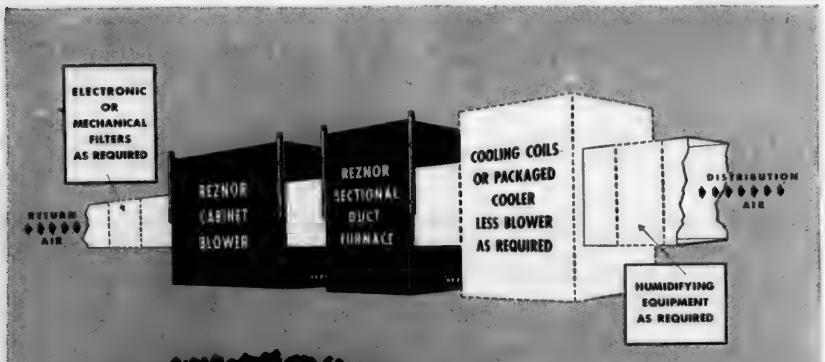
Modine Ports **Conventional Ports**

Modine ports have four times the free area of drilled ports. Sharp edges resist lodging of scale, and single-row arrangement assures maximum combustion efficiency.

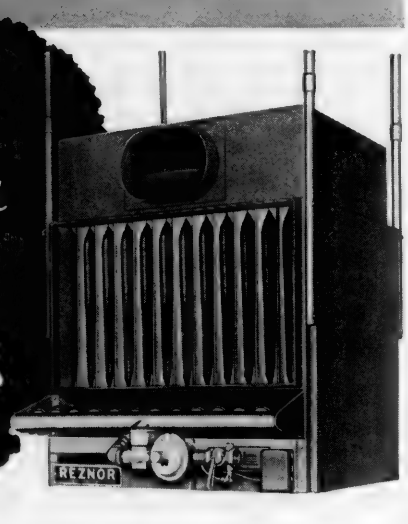
Modine MANUFACTURING COMPANY

Get Bulletin 855 for complete details. Call the Modine representative listed in your classified phone book or write Modine Mfg. Co., 1511 DeKoven Ave., Racine, Wis.

D-1349


ELECTRONIC OR MECHANICAL FILTERS AS REQUIRED
RETURN AIR
REZNOR CABINET BLOWER
REZNOR SECTIONAL DUCT FURNACE
COOLING COILS OR PACKAGED COOLER LESS BLOWER AS REQUIRED
DISTRIBUTION AIR
HUMIDIFYING EQUIPMENT AS REQUIRED

How to Match a Heating System to Exact Job Requirements



Reznor sectional duct furnaces free the designer from the limitations imposed by packaged heating equipment . . . equipment which can't be *exactly right* for any one job because it has to be *good enough* for so many different jobs.

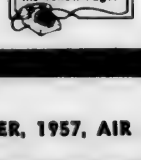
A heating or heating-cooling system designed around a Reznor duct furnace can be matched to exact job requirements. Each duct furnace is a compact, highly efficient heat exchanger with a full set of operating controls. All other components,—for air moving, cooling, cleaning and moisture control—are separately specified and installer-supplied. Only those components which are necessary on the particular job need be included, with each individually selected to fit that one job.

Sectional assembly (a completely new concept in duct heating equipment) completely eliminates the installation problems which formerly prevented the use of large capacity custom-engineered duct heating systems. With the Reznor Series DS sectional duct furnace, systems with capacities in excess of 2,000,000 Btu can be assembled on the job from sections weighing no more than 315 pounds. Each of four basic sections—150, 200, 250, and 300 thousand Btu—is complete with controls and is provided with its own built-in draft diverter, flue connections and mounting pipes.

If you aren't taking advantage of the design flexibility of Reznor sectional duct furnaces, you're missing a good bet on many of your commercial, industrial and institutional jobs. Don't delay getting all the details on this versatile line of heaters. Give your nearby Reznor distributor a call—today.

REZNOR
WORLD'S LARGEST-SELLING DIRECT-FIRED UNIT HEATERS
Reznor Manufacturing Co.,
64 Union St., Mercer, Pa.

for complete details,
wherever you are . . .



NEW CATALOGS

(Continued from page 135)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

PVC PIPE FITTINGS AND FLANGES—Technical data and installation information on unplasticized polyvinyl chloride (PVC) pipe are provided in a booklet available through Tube Turns Plastics, Inc., Louisville, Ky. It also gives complete specifications for threaded and socket types of PVC fittings, valves and flanges made of both normal and high impact material. The booklet contains pressure-temperature charts, chemical resistance tables, support spacing formulas and lists leading industrial organizations that are now using PVC piping in increasing amounts.

Circle **Item 72** on Inquiry Card

HEAVY DUTY FANS—A 24-page bulletin explaining the construction, operations, and specifications of a rugged line of fans designed for heavy industry, commercial installations, and public buildings has been announced by Chicago Blower Corp., Franklin Park, Ill. This two-color bulletin, MD-100, describes in detail the specific applications of this standard line of aerodynamically-designed, packaged direct-drive units and V-belt fans. Performance data are also presented.

Circle **Item 73** on Inquiry Card

AUTOMATIC VALVE LINE—A 12-page condensed catalog featuring their complete line of automatic valves is available from A. W. Cash Valve Mfg. Corp., Decatur, Ill. The catalog covers main uses, installation tips, and construction features along with specification tables for each principal series of valves. Cut-away illustrations show how each type of valve is designed.

Circle **Item 74** on Inquiry Card

BETTER AIR CLEANING — Air Filter Institute, Washington, D. C., announces the availability of Bulletin No. 50. The data sheet is entitled Streaking & Smudging Around Air Outlets, and it discusses source of dirt, control of dirt in primary and secondary air streams, and maintenance of ceiling outlets.

Circle **Item 75** on Inquiry Card

ICE BANK COOLING PLATES — Published by Dean Products, Inc., Brooklyn, N. Y., is a price list, No. IBC-57, covering the company's ice bank cooling plates. These plates are valuable for industrial use where large quantities of chilled water are required. Ice banks utilize the latent heat of ice to store refrigeration available in slack periods to be used during peak requirements.

Circle **Item 76** on Inquiry Card

MPS AND CIRCULATORS—A handy mp selector chart, designed to help mmercial and domestic users of ating and cooling equipment choose e right model for their specific plication, is contained in a new talog data sheet available from rnes Manufacturing Co., Mansfield, io. The data sheet, No. 345, gives ads, capacities, and other helpful formation on pumps and circulators ed in air-conditioning, refrigeration, d circulation applications.

Circle **Item 77** on Inquiry Card

OW METER LINE—Bulletin 110 from rooks Rotameter Co., Lansdale, Pa., ilizes a novel and convenient means r aiding prospective users of the mpany's flow meters in the selec- n of the appropriate meter for a ecific application. A die-cut disc, eletted on the inside cover of the lletin serves to indicate the pres- re and temperature limitations of e rotameters as well as their flow pacity ranges. The indicated meter turn is tied into brief description ven on an opposite page with refer- ce to further detailed literature.

Circle **Item 78** on Inquiry Card

ALVES AND CONTROLLERS — A. W. ash Co., Decatur, Ill., has published catalog on the Cash Standard and ash Standard Stacon lines of pres- re reducing and regulating, relief, ck pressure and control valves; con- ollers; differential regulators; oil mping units; governors; combina- n and temperature regulators. In- uded in the 8-page catalog is a otograph of each unit, with descrip- e copy covering its function, appli- ion, construction, and range of es.

Circle **Item 79** on Inquiry Card

W-TEMPERATURE PIPE COVERING— technical data brochure on Styro- m low-temperature pipe covering s been announced by Glo-Brite Prod- ts, Inc., Chicago, Ill. Sizes, prices, d a comprehensive guide in ordering e given in this brochure for anti- eat, light, standard, and heavy- ty pipe covering as well as fitting vers and vessel-tank insulation. A ecial list gives sizes and prices for mestic pipe sizes coverings to com- t condensation problems on cold ter pipes in the home.

Circle **Item 80** on Inquiry Card

ST AND CORROSION TREATMENT— eatment for rust and corrosion in eam lines, return lines, radiators and eam heated processing equipment is scribed in 2-page Bulletin M-A, ailable from The North American ogul Products Co., Cleveland, Ohio. e company's liquid treatment dis- tegrates and removes existing cor- sion deposits and holds them in sus- nsion so they may be eliminated at ain valves. At the same time, it utralizes harmful acids and gases eventing new rust or corrosion de- sits. The treatment is safe and pro- cts the entire system including lines, rainers and traps.

Circle **Item 81** on Inquiry Card

(Continued on page 140)

NOW!
A NEW
STANDARD
FOR THE
HANDLING
OF AIR

NEW AIRFO CE

Full Range Application

GENERAL PURPOSE
Classes I and II
Up to 6-3/4" Total Pressure

HEAVY DUTY
Classes III and IV
Up to 16-3/4" Total
Up to 700,000 CFM

Series 8000

FOR

1. Building Ventilation
2. General Supply and Exhaust
3. Conventional and High Pressure Air Conditioning
4. Vehicular Tunnel Ventilation
5. Industrial Processing
6. Combustion Air Supply

WESTINGHOUSE AIR HANDLIN

CENTRIFUGAL FANS!

...the new standard in a complete line

Westinghouse Airfoil Blading has proved its effectiveness in six years of operation by two hundred customers in Mechanical Draft, Industrial Process, and High Pressure Air Conditioning!

Westinghouse now obsoletes conventional flat blading and brings you the efficiency and quietness of Airfoil Blading for ALL PURPOSE applications in a complete standard line of Centrifugal Fans, covering every requirement up to 700,000 CFM... Up to 16-3/4" total pressure. J-80633-R

WESTINGHOUSE AIRFOIL CENTRIFUGAL FANS NOW GIVE YOU...

★ **LOWEST OPERATING COSTS...**
High Efficiency—Low Horsepower!

★ **QUIET OPERATION**
Airfoil Blading—Streamlined Air Flow!

★ **CAPACITY PROTECTION**
Steep Pressure Curve—Minimum Capacity Variation!

★ **NON-OVERLOADING FEATURE!**
Full Load at Motor Rating—No Overload!

★ **AMCA (NAFM) STANDARD SIZES!**

YOU CAN BE SURE...IF IT'S Westinghouse

More information? WRITE...

Westinghouse Electric Corporation
Sturtevant Division, Dept. 25A
Hyde Park, Boston 36, Massachusetts

Sirs:

Please send me your Catalog 1121 on Series 8000 Airfoil Fans — The New Standard!

NAME_____

TITLE_____

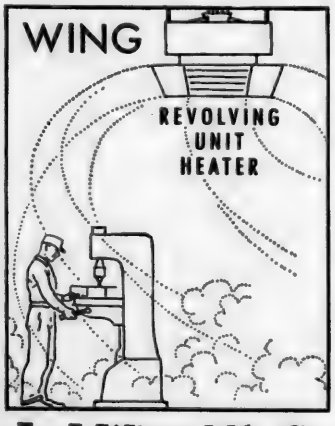
COMPANY_____

ADDRESS_____

CITY_____ STATE_____

. . . Why don't they get

WING Revolving Heaters?



Are your workers subjected to steady blasts of heat from suspended unit heaters with fixed discharge outlets? Are some uncomfortably hot while others are just as uncomfortably chilled? Wing Revolving discharge unit heaters are the logical solution to these important personnel problems. The heated air is discharged from slowly revolving outlets and this warm air stream caresses the workers in its circular path for a few seconds at a time, just enough to give a sensation of live, invigorating warmth.

Factories heated by Wing Revolving Heaters are pleasant places to work. Convince yourself—try one.

Write for a copy of Bulletin HR-6A. Use the coupon.

L. J. Wing Mfg. Co.
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158 Vreeland Mills Road, Linden, N. J.

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L. J. Wing Mfg. Co., Linden, N. J. AC-9
Please send me Bulletin HR-6A-Revolving Heaters

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Firm.....
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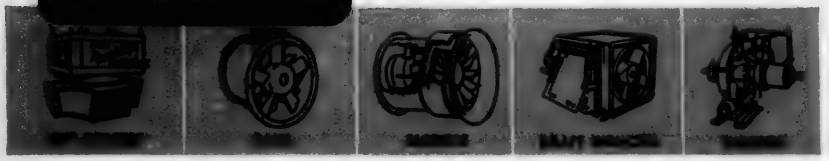
Wing



NEW CATALOGS

(Continued from page 137)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

COOLING TOWERS—A 12-page bulletin is available from Baltimore Aircoil Co., Inc., Baltimore, Md., featuring their line of TM blow-through and TU draw-through cooling towers. This bulletin covers the complete line of factory-assembled centrifugal fan cooling towers in 19 sizes, from 10 to 400 tons. The construction, components, and finish of the units are described in detail, utilizing illustrative photographs. The new selection charts make it easy to select the proper size unit for any load conditions.

Circle **Item 82** on Inquiry Card

CORROSION INHIBITOR—A six-page folder, describing an improved corrosion inhibitor for closed circulating water systems with or without antifreeze, is available from Hagan Chemicals & Controls, Inc., Pittsburgh, Pa. Schematic drawings illustrate use of the company's Corrosion Inhibitor C in hot water heating systems, diesel engine cooling systems, and air conditioning systems. The preparation of feed solutions and determination of proper concentrations for these systems are also discussed.

Circle **Item 83** on Inquiry Card

CENTRIFUGAL WATER CHILLERS—A 4-page folder, Form No. AC-285, is available from Airtemp Div., Chrysler Corp., Dayton, Ohio. It describes features and components of the company's recently introduced series of centrifugal water chillers in sizes from 150 to 500 tons.

Circle **Item 84** on Inquiry Card

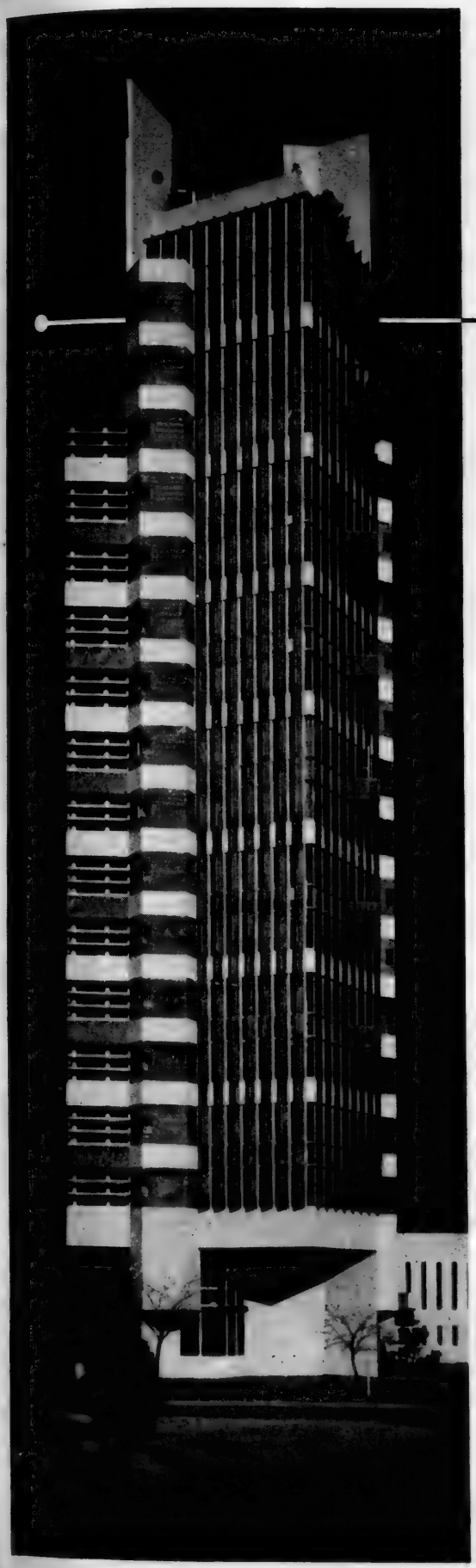
METERS AND VALVES—Published by Rockwell Manufacturing Co., Pittsburgh, Pa., is a 28-page condensed catalog, No. C-5000, describing the company's line of gas meters and pressure regulators, water meters, and valves.

Circle **Item 85** on Inquiry Card

AIR HANDLING INFORMATION—24-page Air Engineering Data File (Bulletin E-57) from Aerovent Fan Co., Inc., Piqua, Ohio, covers engineering and test facilities for propeller fans as well as specifications, construction, maintenance, and installation. Helpful tables for estimating air-handling requirements, entrance and elbow losses, and duct sizes are found in this new folder. Also included are specifications for special-application equipment.

Circle **Item 86** on Inquiry Card

(Continued on page 142)



PRICE TOWER

Bartlesville, Oklahoma

Architect
FRANK LLOYD WRIGHT

Consultant
WM. J. COLLINS, JR.

Contractor
W. A. LANDERS COMPANY

Clean Air
AMERICAN AIR FILTER CO., INC.

Besides being one of the outstanding architectural designs of this decade, Price Tower sets the pace in *clean-air comfort,* too!

Ventilation air in this modern building is *super-clean;* electronically cleaned by Electro-MATIC, AAF's automatic, self-cleaning electrostatic precipitator. Electro-MATIC eliminates the most minute dust particles (even smoke!) and continuously cleans itself at the same time.

No time out for washing . . . no media to clean . . . *not even buttons to push!* For complete information, call the AAF representative in your area or write direct for Electro-MATIC Bulletin No. 250H.

AAF
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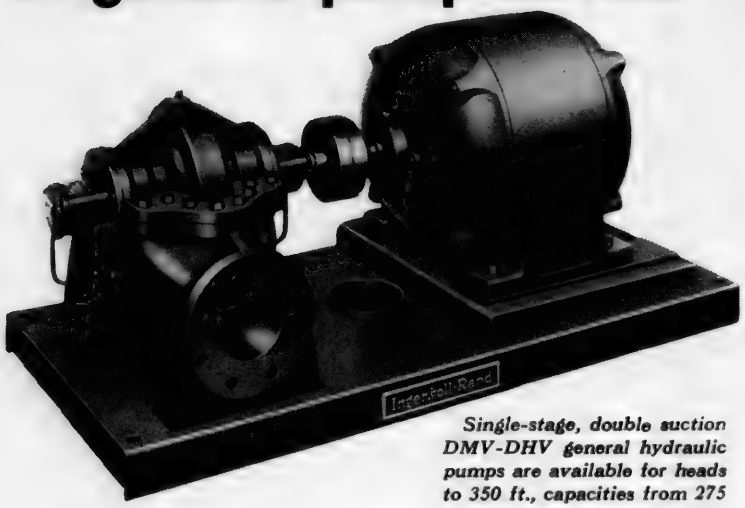
American Air Filter
COMPANY, INC.
294 Central Avenue, Louisville 8, Kentucky
American Air Filter of Canada, Ltd., Montreal, P. Q.

ENDS MAINTENANCE

in general pump service



Single-stage, double suction DMV-DHV general hydraulic pumps are available for heads to 350 ft., capacities from 275 to 2400 gpm.

Double shaft seals and sealed ball bearings—standard equipment on **DMV—DHV** *pumps do away with stuffing box attention and bearing lubrication*

Now, with the DMV-DHV pump, you no longer have any stuffing box worries. There's no repacking! No annoying pump shaft leaks! The Double Mechanical Shaft Seals used are completely self-adjusting. They don't require attention throughout their entire service life.

Moreover, greasing or oiling of pump bearings is done away with. Modern Cartridge-Type Ball Bearings are employed—with the lubricant permanently sealed in. Here's another advanced feature that makes the DMV-DHV design the simplest, most maintenance-free pump ever developed by Ingersoll-Rand for general hydraulic service.

Greater Compactness is obtained with this modern construction using mechanical shaft seals and sealed bearings.

See your nearest Ingersoll-Rand representative for further information.

Ingersoll-Rand

10-290 Cameron Pump Division
11 Broadway, New York 4, N. Y.

PUMPS • CONDENSERS • TURBO-BLOWERS • COMPRESSORS • ROCK DRILLS
GAS & DIESEL ENGINES • AIR & ELECTRIC TOOLS

NEW CATALOGS

(Continued from page 140)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

PLUMBING AND HEATING VALVES—A new catalog (Bulletin PH58) is available from The Dole Valve Co., Morton Grove, Ill., showing the company's complete line of valves. This catalog explains valve requirements of plumbing and heating systems, and how these valves operate to meet the requirements. Among the valves described are air and vacuum radiator venting valves for steam and hot water systems, water mixers, relief valves, flow control valves, solenoid valves, and shower flow controls.

Circle **Item 87** on Inquiry Card

BASEBOARD ELECTRICAL OUTLETS—The company's Baseduct, surface raceway electrical distribution system at the baseboard level, is reviewed in a 4-page illustrated bulletin available from National Electric Products Corp., Pittsburgh, Pa. The combination multi-outlet assembly and surface raceway system is suggested for use in new construction of residential, commercial, industrial, and institutional structures. It is also recommended as an economical application for rewiring existing homes and buildings.

Circle **Item 88** on Inquiry Card

THERMOCOUPLE SELECTOR SWITCHES—Thermo Electric Co., Inc., Saddle Brook, N. J., has published a bulletin, No. 24-1, on its key or push-button selector switches for thermocouple or resistance bulb circuits. These switches provide a fast, convenient means of frequently checking many thermocouples or resistance bulbs, switching them from one instrument to another, or switching one instrument to many different measuring points. The bulletin describes in detail the various types of two- and three-position key switches and push-button switches. Individual diagrams illustrate how each type is incorporated in the circuit. Also included is all pertinent information on construction features and individual case capacities for thermocouple and resistance bulbs.

Circle **Item 89** on Inquiry Card

PLUG VALVE LUBRICANTS—A 16-page illustrated catalog from Homestead Valve Mfg. Co., Coraopolis, Pa., gives lubricant recommendations for nearly 4000 service conditions for which lubricated plug valves can be used. This catalog, Section 5A of Reference Book 39, also shows lubricated plug valve accessories, fittings, automatic lubricators, lubricant guns, and gives full information for choosing and ordering correct lubricants.

Circle **Item 90** on Inquiry Card

(Concluded on page 144)

On left, Clarage Multitherm supplying conditioned air to the electrophoresis balance room. Exhaust fans in background.

In foreground, Multitherm supplying make-up air exhausted by laboratory hoods.

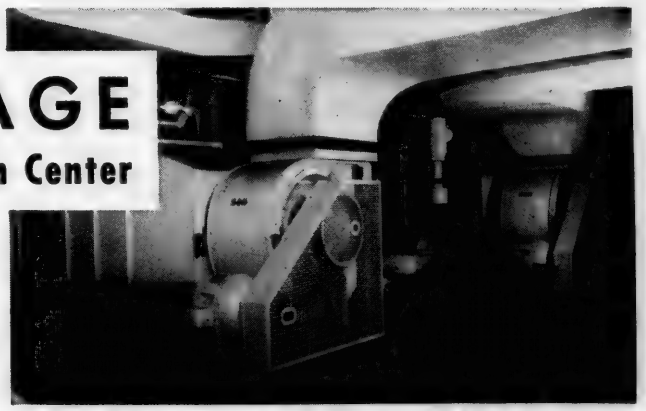
AIR via CLARAGE

in Wyeth's new Office and Research Center

One of the most modern of its type, this virtually window-lined building at Radnor, Pennsylvania serves Wyeth Laboratories, Inc.

As for so many other notable installations, Clarage equipment was chosen for the air handling and conditioning — Clarage Type NH and Type HV system fans, Multitherm air conditioning units, Ready Unit ventilating sets.

Clarage equipment has a long-standing reputation for doing the job quietly, economically, and dependably in buildings of all types, all sizes. Make sure *your* investment in air handling and conditioning is a profitable one by choosing Clarage quality.



Type HV fans supplying air to dining room and office interior.

ARCHITECT:
Skidmore, Owings & Merrill — New York City.

ENGINEER:
Seelye, Stevenson, Value & Knecht—New York City.

GENERAL CONTRACTOR:
George A. Fuller Co. — New York City.

MECHANICAL CONTRACTOR:
W. M. Anderson Co. — Philadelphia, Pa.

CLARAGE FAN COMPANY Kalamazoo, Mich.

. . . dependable equipment for making air your servant

SALES ENGINEERING OFFICES IN ALL PRINCIPAL CITIES • IN CANADA: Canada Fans, Ltd., 4285 Richelieu St., Montreal

for FUME

CONTROL

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FLEXAUST®

HOSE

Made of strong neoprene coated cotton or nylon fabrics spiral wire reinforced.
For *all* kinds of fume and dust control, and ventilation uses.
Extremely flexible, durable, and lightweight.
Exceptionally easy to cut, install, connect, reuse, and relocate.
Sizes 1¼" thru 36" i.d.

Write for details today
Distributors in all principal cities

THE FLEXAUST COMPANY
Dept. HV-9
100 PARK AVE. NEW YORK 17, N. Y.

NEW CATALOGS

(Concluded from page 142)

Use the prepaid postcard on last page for securing your copies of catalogs described in this department.

FLEXIBLE PLASTIC PIPE — A special issue of the company's publication, Pipe Facts, is offered by E. I. du Pont de Nemours & Co., Inc., Wilmington, Del. The 12-page booklet tells the story of flexible plastic pipe made from the company's polyethylene resin, Alathon 25, including applications of the pipe to date.

Circle **Item 91** on Inquiry Card

COMPACT 2-DRUM BOILERS — Available from Erie City Iron Works, Erie, Pa., is a newly revised catalog on the company's VC 2-drum boilers. The boilers are said to provide high capacity in a compact design that saves space and lowers installation and maintenance costs. Within its 12 pages the catalog delineates improved features of the boilers as well as design, construction and application data.

Circle **Item 92** on Inquiry Card

REGULAR, HIGH IMPACT PVC PIPE— A 12-page two-color catalog available from Alpha Plastics Inc., Livingston, N. J., describes the firm's regular and high impact corrosion-resistant rigid polyvinyl chloride pipe. Included are tables of pipe sizes available, specific chemical applications, physical properties, temperature factors for various working pressures, support spacing, and thermal expansion. Flow charts, installation instructions, pipe characteristics, and fields of application also are included.

Circle **Item 93** on Inquiry Card

TOILET COMPARTMENTS—Literature from Henry Weis Mfg. Co., Inc., Elkhart, Ind., describes and illustrates the company's available styles of toilet compartments. Also offered is a color chart showing 24 baked enamel finishes applicable to the metal toilet compartments.

Circle **Item 94** on Inquiry Card

COMBUSTION CONTROL SYSTEMS — The first of a series of ten contemplated educational booklets on Systems Engineering Applied To Combustion Control is ready for distribution according to the publisher, Cleveland Fuel Equipment Co., Cleveland, Ohio. Thoroughly developed in this first booklet are the reasons for, and the fundamentals of draft control. The requirements and mechanics of draft control are treated in an easy-to-read, step-by-step exposition. Interlocked controls and safety devices are explained. By registering for a copy of Booklet No. 1, the reader's name will be automatically placed on the mailing list to receive all successive booklets.

Circle **Item 95** on Inquiry Card

TEMKON

Air Conditioning and Refrigeration

TEMPERATURE LIMITED

Burlington Road,
London, SW6
Cables: Temtur, London

Largest Producer of Air Conditioning Units outside the U.S.A.

LOW INSTALLATION

AND MAINTENANCE COSTS

... plus added years

of dependable service

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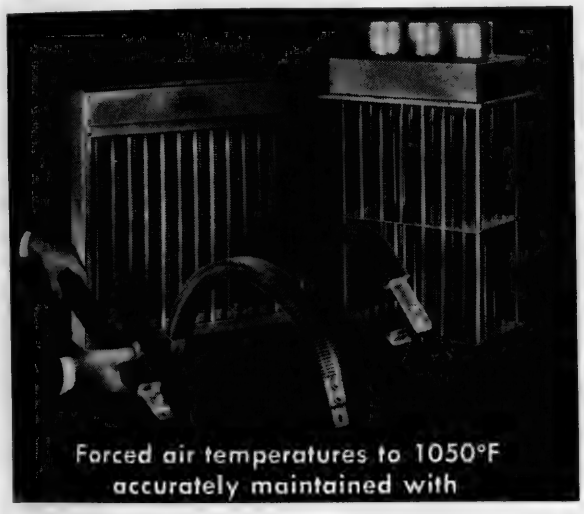
TODD NEW YORK, U.S.A.



Forced air temperatures to 1050°F accurately maintained with

CHROMALOX *Electric* Air Duct Heaters

For heating air under forced circulation, Chromalox Electric Air Duct Heaters are the efficient, economical answer.

For space heating or for adapting your present air-conditioning systems for central heating.

Heaters can be installed quickly and easily in round or rectangular ducts and accurately controlled either manually or by automatic thermostat.

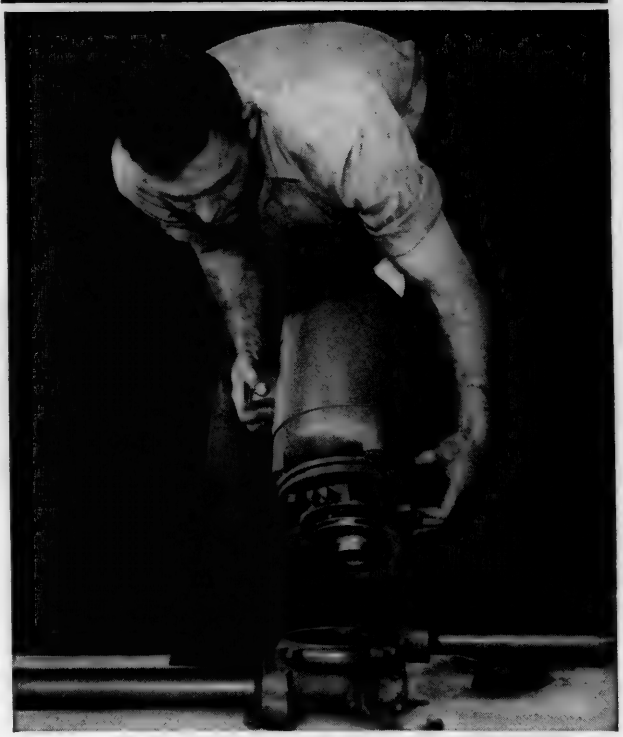
115, 208, 230 and 460 volts. 91 *standard stock* types, sizes and ratings are ready for immediate delivery.

C-2132

FREE BULLETIN—Call your Chromalox Representative or write for Bulletin F-1559

Edwin L. Wiegand Company
7588 Thomas Boulevard, Pittsburgh 8, Pa.

So easy to handle, so compact

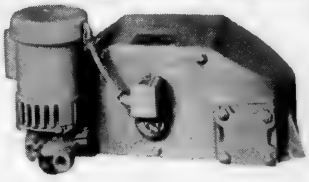


Type SCC Hot Water Pump can be completely disassembled by removing only 4 bolts.

... you know it's a Wheeler-Economy Pump!

Engineers have chosen Wheeler-Economy Pumps hundreds of thousands of times for heating and air conditioning systems. They're compact, easy to install and maintain, and give many years of dependable service. Operation is smooth and quiet... design and construction are top quality.

SCC HOT WATER AND AIR CONDITIONING CIRCULATING PUMPS are space-saving vertical design, yet can be installed horizontally. Ideal for any type package equipment requiring small pumping units. Bronze-fitted with close-grained cast iron casing and motor stand. Bronze impellers dynamically balanced, hand-fitted. Highest quality mechanical seals for leakproof operation.



CONDENSATE RETURN PUMPS have capacities of 2000-8000 sq. ft. EDR, handle condensate to 200°F. Can be operated over wide pressure range without overloading motor. Close-coupled. Easy installation—no sub-base. Disassemble quickly without disconnecting piping. Convert to duplex operation simply by removing blind flange and adding motor and mechanical alternator.

Economy Pump Division
C. H. Wheeler Mfg. Co. 19th and Lehigh Avenue, Philadelphia 32, Pa.

Please send free information on your heating and air-conditioning pumps.

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COMPANY _____

STREET ADDRESS _____

CITY _____ ZONE _____

STATE _____

Centrifugal, Axial and Mixed Flow Pumps • Steam Condensers • Vacuum Equipment • Marine Auxiliary Machinery • Nuclear Products

Cordley
NEW YORK

More built-in EXTRAS

**for more service . . .
more convenience . . .
more value!**

STURDY, NON-JAMMING FOOT PEDAL

Made of strong stainless steel. It's U-shaped—nothing can get underneath to stop the action. Wide-open design makes for easier cleaning, too. Floor limits travel—prevents damage.

CORDLEY OFFERS ALL THESE FEATURES
. . . and many more!

- Solid stainless steel splash-proof top
- Squirt-proof bubbler jet
- Fully sealed refrigeration system
- 7-point thermostat
- Contamination-proof – refrigerant coils bonded *externally*
- Extra service connections–for both glass filler and remote outlets
- Bubbler jets aimed for *easy* drinking – no neck craning
- Attractive, adaptable styling
- *Generous 5-year Guaranty*

NOW AVAILABLE IN 3 DISTINCTIVE LINES:

There's a Cordley cooler to meet any drinking water requirements!

**VALUABLE FREE BULLETIN . . .
"HOW TO SELECT A WATER COOLER"
WRITE TODAY!**

**CORDLEY & HAYES
443 Fourth Avenue, New York 16, N.Y.**

It points out, for instance, that unduly noisy or messy work will be done at night.

By far the most valuable effect of the brochure is in getting across to tenants an appreciation of the tremendous cost. The current Pacific Mutual Building project is believed to be the largest air conditioning system ever installed in an existing building in the West.

The folder also gives the company a means to publicly acknowledge work of engineers, architects, contractors,

and manufacturers who play such a vital role in making the job possible. Many more people appreciate air conditioning when they realize the great number of specialists required to create it, Pacific Mutual says.

This approach has proven so successful that the Downtown Business Men's Association, Associated Building Managers of Los Angeles, and the Building Owners and Managers Association have all requested copies for mailing to their entire memberships.

To date, Sheehan has received numerous complimentary letters and phone calls from tenants telling him how much they appreciate being taken into confidence. So far the first complaint is yet to come. This is in spite of the fact that rents will be increased to meet the cost of installation and maintenance.

BUILDING INDUSTRY TV SERIES

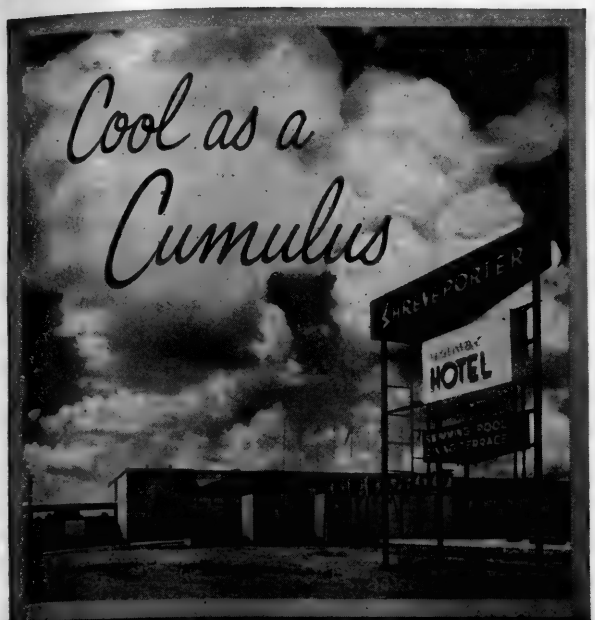
to educate public on how the industry serves them, is expected to aid architects, engineers, builders.

The story of the nation's largest industry, construction, will be carried to the American people through the medium of television beginning in the Fall. Announcement of the show, *Building America,* was made this week by Fred M. Hauserman, president of Producers' Council, the sponsoring organization.

The program, a filmed documentary series, is planned for showing by over 200 television stations with an estimated weekly audience of more than 7,500,000. It will be distributed through the Public Service Network, Princeton, N. J.

• **AN INDUSTRY FIRST**—This is the first time that any concerted industry-wide effort has been made to inform the public of the importance of the building industry to their living standards and modes of living. It is hoped the series will increase public awarness of how the $50-billion industry is serving them. At the same time, the

(Continued on page 148)



Quiet Beyond Belief!

d-h AIR CONDITIONING

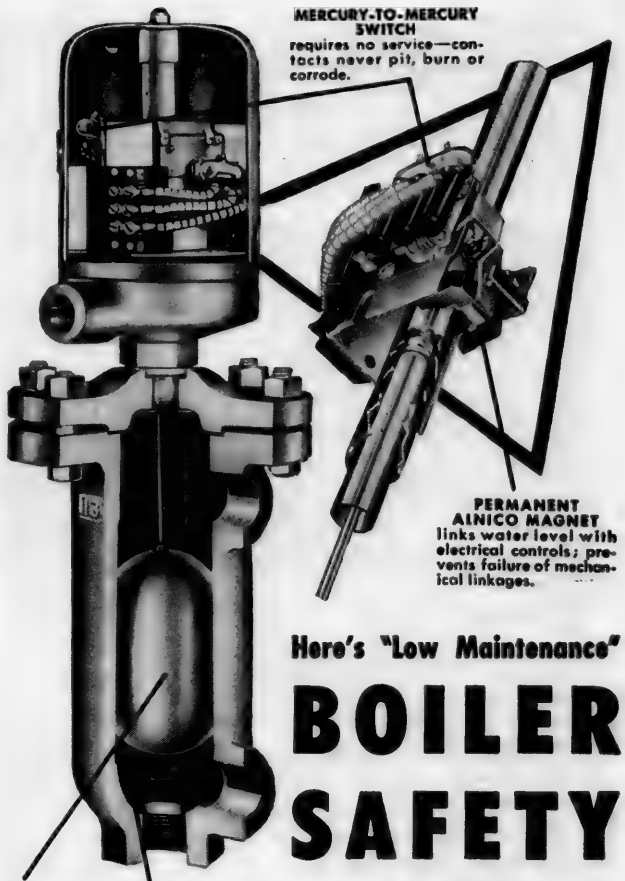
Says: Jack Tullos, President-Manager of the eye-filling new Shreveporter Highway Hotel...

- "Quite a saving in initial and operating costs!"
- "Periodic filter change our only maintenance."

Drayer-Hanson can cite similar case histories, world-wide: big jobs or small; new or old construction; residential, commercial, industrial...

Request SPOTAIRE literature

drayer-hanson
DIVISION OF NATIONAL-U.S. RADIATOR CORP
3301 MEDFORD STREET
LOS ANGELES 63, CALIFORNIA
CABLE: FORTRADE


MERCURY-TO-MERCURY SWITCH
requires no service—contacts never pit, burn or corrode.
PERMANENT ALNICO MAGNET
links water level with electrical controls; prevents failure of mechanical linkages.
CORROSION-RESISTANT FLOAT
is made of 304 Stainless Steel for long, trouble-free service. Can also be made of special materials for extreme local conditions.
NO-SCALE FLOAT CHAMBER LINER
"flexes" off scale; prevents float "sticking".

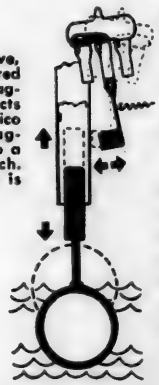
Here's "Low Maintenance"

BOILER SAFETY

MAGNETROL

BOILER WATER LEVEL CONTROLS

"Blow-down" the float chamber once-a-shift; inspect the switches once a month—that's all you have to do to keep a Magnetrol in tip-top *safe shape.* It's made that way. The secret is all in the simple magnetic operating principle *as pioneered and perfected by Magnetrol.*



A magnetic sleeve, raised and lowered within a nonmagnetic tube, attracts or repels an Alnico permanent magnet attached to a mercury switch. Basically, this is Magnetrol.

Standard Magnetrol Units are available for pressures to 600 psi and temperatures to 750°F., for single or multi-stage control with as many as three separate switching actions. Also special units for more extreme requirements. For full details, mail coupon.

MAGNETROL, Inc.

MAGNETROL, INC., 2106 S. Marshall Blvd., Chicago 23, Ill.
Please send Catalog Section III with full information about Magnetrol Boiler Water Level Controls.

Name_____

Company_____

Address_____

City_____ Zone____ State_____

DRY AIR...
PRECISELY as you want it

NIAGARA CONTROLLED HUMIDITY AIR CONDITIONING

This method removes moisture from air by contact with a liquid in a small spray chamber. The liquid spray contact temperature and the absorbent concentration, factors that are easily and positively controlled, determine exactly the amount of moisture remaining in the leaving air. Heating or cooling is done as a separate function.

The Niagara's Controlled Humidity Method using HYGROL moisture-absorbent liquid is

Best and most effective because . . . it removes moisture as a separate function from cooling or heating and so gives a precise result constantly and always.

Most reliable because . . . the absorbent is continuously reconcentrated automatically. No moisture-sensitive instruments are required to control your conditions.

Most flexible because . . . you can obtain any condition at will and hold it as long as you wish in either continuous production, testing or storage.

Easiest to take care of because . . . the apparatus is simple, parts are accessible, controls are trustworthy.

The cleanest because . . . no solids, salts or solutions of solids are used and there are no corrosive or reactive substances.

AT THE
CHEMICAL SHOW
26th EXPOSITION OF CHEMICAL INDUSTRIES
Coliseum, New York City, December 2 - 6, 1957
See NIAGARA
AIR CONDITIONERS • Aero HEAT EXCHANGERS
Aero AFTER COOLERS • Aero REFRIGERANT CONDENSERS • Aero STEAM CONDENSERS
Aero VAPOR CONDENSERS • HUMIDIFIERS
HEATERS • COOLERS • DRYERS
BOOTH No. 558

Write for full information; ask for Bulletins 112 and 121. Address Dept. HV-9.

NIAGARA BLOWER COMPANY
405 Lexington Ave., New York 17, N. Y.
District Engineers in Principal Cities of U.S. and Canada

series will be of direct benefit to architects, builders, distributors and other segments of the building industry, according to the Council.

Each program will be made up of four five-minute documentaries. A three-minute editorial or interview will present current news from the industry. Represented in these editorials will be exciting new ideas and developments of the industry being introduced by architects, engineers, and builders. Governmental policies and action, as related to the industry, will be discussed by administration and congressional leaders.

LITTLE INCH

conversion from natural gas to common carrier of liquid petroleum products will cut fuel costs.

A reconversion job said to cost about $35 million is underway on the Little Inch pipeline. After 10 years of hauling natural gas along with its Big Inch brother, the

20-in line will carry gasolines, heating oils, diesel, jet and distillate products, as well as butane and propane, according to *LPGA Times*.

• **BUILT DURING WAR**—Big Inch (24 inches in diameter) and Little Inch (20 inches) were built as anti-submarine defenses early in the last World War. In 1947 Texas Eastern Transmission Corporation (TET) bought them and converted them to natural gas service. Big Inch will continue to serve that function.

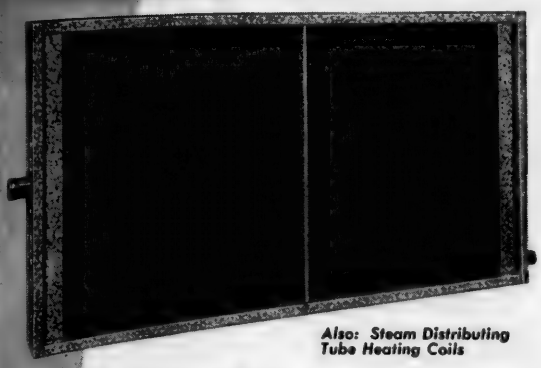
Service will be between (1) Baytown, Tex., and (2) Moundsville, W. Va., as shown on map. Underground Storage and Exploration, Inc., is contemplating a 12-inch link between (2) Moundsville and (5) Newark, N. J., while TET plans a 14-inch spur from (3) Seymour, Ind., to (4) Chicago, Ill.

• **MUCH CHEAPER THAN RAIL**—Speakers on LP-gas economics urge pipeline use to offset the growing rail tariffs, *LPGA Times* explains. An LPGA traffic meeting was told that on the Oklahoma-Chicago run, pipe charges were 1.4c per gal. as contrasted with 3.3c for rail. The Federal Power Commission, in approving the conversion of Little Inch, was persuaded in part by a statement of one of the backers of the project that 7.5 of the 13.5 cents marketers in the Northeast are paying for LP gas is for freight.

(News of the Month concluded on page 150)

RIGIDBILT

STANDARD STEAM HEATING COILS



Also: Steam Distributing Tube Heating Coils

MAXIMUM HEAT TRANSFER ASSURED!
All tube outlets from header are extruded, providing double thickness for tube insertions. Tubes are fabricated from 0.035" copper, nipple connections are brass, thus assuring strength for longer life with utmost economy.

RIGIDBILT IS BETTER BUILT — Write for Catalog

RIGIDBILT INC.

2852 WEST FULTON BLVD., CHICAGO 12, ILL.

HEATING • AIR CONDITIONING • REFRIGERATION

SAVE TIME and MONEY

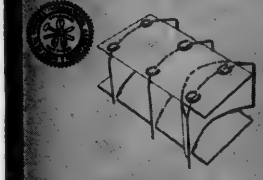
when you form

FLEXIBLE CONNECTORS

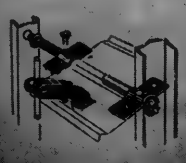
ELGEN SILENT DUCT

Imagine, this one-piece, factory-assembled metal-to-material unit unrolls absolutely *flat!* No more bothering with unwieldy duct material that buckles easily. Elgen Silent Duct makes on-the-spot work a cinch . . . you just measure and cut. You can fabricate *any type* of flexible duct connector in minutes . . . with half the effort! You can save up to 60%! No more worry about an inventory of "made-up" parts, either. Your choice of U.L. approved, (Gov't. Spec. Mil-D-10860) canvas, Johns-Manville asbestos and U. S. Rubber neoprene coated fibre glass, in 3" or 6" widths attached to 24 or 26 gauge galvanized steel or 24 gauge aluminum to fill every job requirement. All available in handy-to-use 25, 50 or 100 foot rolls.

2 More Elgen Products That Put Profits In Your Pocket!



ELGEN ALL-TITE VANE RUNNER
• Quickest and easiest way ever devised for installing turning vanes for square elbows • No special tools required; vanes lock easily with blow of hammer.



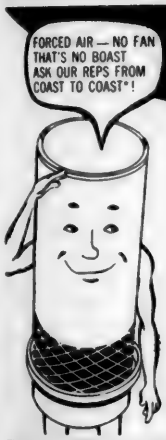
ELGEN DAMPERSET
For Multi-Blade Dampers Parallel or Opposed • Most perfect damper hardware developed • Assembles in a jiffy . . . cuts assembly time in half • Easily adjusted and self-aligning. Licensed by Minneapolis-Honeywell

ELGEN PRODUCTS ARE SOLD THROUGH LEADING JOBBERS EVERYWHERE.

"Put Profits In Your Pocket!"

Write today for free catalog and "spec" sheets!

ELGEN MANUFACTURING CORP. 41-34 39 Street Long Island City, N. Y.



Jetty SALUTES THESE FORWARD LOOKING REPRESENTATIVES OF

KOCH JET forced draft COOLING TOWER

R. T. Andrews
4305 Laurelwood Way
Sacramento 21, Calif.

Bill Potts
P.O. Box 3244
Jackson 4, Miss.

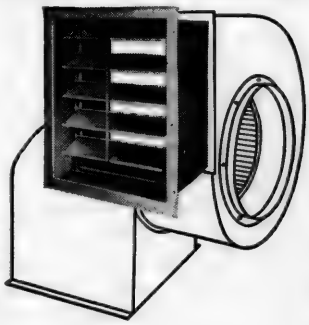
Gus Pailet
4824 Woodside Drive
Baton Rouge 4, La.

KOCH
ENGINEERING CO., INC.
321 West Douglas
Wichita, Kansas

* Write today for the name of the Koch Representative nearest you.

ELGO AUTOMATIC SHUTTER

for Unit Blower



Self-contained in adapter sleeve for attachment to blower. Louvers of light gauge aluminum with felt silencer strips. Rustproof hinge rods. Weather-stripped. Built to fit your blowers.

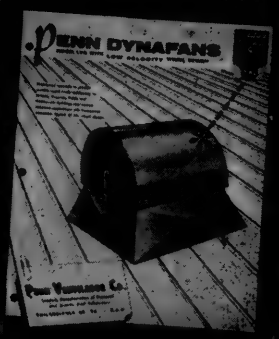
Write for circular and prices

Free CATALOG

ELGO SHUTTER & MANUFACTURING CO.
2738 W. Warren Detroit 8, Mich.

NOW READY...

A NEW BULLETIN ON quiet-operating CENTRIFUGAL ROOF EXHAUSTERS



featuring

PENN DYNAFANS

WITH LOW VELOCITY WHEEL DESIGN

Expressly suited for schools, hospitals, public and commercial buildings where sound levels must be held to a minimum.

Your copy of Penn's new 8-page catalog, Bulletin PD-42 is now available. Contact the Penn Ventilator man in your area or write direct to get the complete story on the leading fully-housed centrifugal roof exhauster.

PENN VENTILATOR CO.
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Right on top . . . for more than 30 years!

IN CANADA: Toronto: Control & Metering, Ltd. 2271-A Bloor St., W.
Montreal: Air-Care, Ltd. 2222 Beaconsfield Ave.
Charter Member of Air Moving & Conditioning Assoc.

NEW INSIGNIA

identifies plastic suppliers, extruders who sponsor research, education program.

A new insignia has been adopted by the members of the Plastic Pipe Research Council of the Society of the Plastics Industry as a means of identifying plastic pipe for the transmission of drinking water when used in connection with the National Sanitation Foundation Seal of Approval and also as a device for identifying these select plastic pipe extruders and raw material suppliers, members of the Society of the Plastics Industry, who are sponsoring the industry's research and education program.

MEMBER · SPI PLASTIC PIPE RESEARCH COUNCIL · PLASTIC PIPE FOR DRINKING WATER

NATIONAL SANITATION FOUNDATION · nsf · TESTING LABORATORY

Insignia, as shown at left, may only be used by members of the Plastic Pipe Council in advertisements, etc.

The National Sanitation Foundation Seal of Approval, shown at right, has been awarded to those raw material manufacturers and pipe extruders whose products meet the Foundation's standards for both raw materials and plastic pipe used for the transmission of drinking water.

DEPARTMENT STORE

air conditioning reduces summer slumps, cuts costs, and holds employes, survey shows.

Sharp business increases and improved employee morale as a result of air conditioning of some of the nation's leading department stores are revealed in the result of a survey made by Carrier Corporation. Sales and office staff attitudes toward their work remain consistently high through the hottest weather.

• **SUMMER SALES UP**—Turnover has been reduced in several department store chains, since employees who would normally resign during the summer months tended to remain at work in an air conditioned building. These same stores noted sharp business increases for the summer months and attributed the rising sales curve to the air conditioning.

• **SOILAGE DOWN**— One chain store reports fabric soilage dropped off significantly after the system's installation. Dust and dirt from the street had settled on exposed merchandise and was ground into the cloth as perspiring customers and sales people handled it.

In all cases, the stores polled reported that summer "try-ons" of winter clothing were encouraged by the lower temperatures, with the result that hot-weather sales of such clothing were unusually successful.

In some instances, stores noted that savings will be realized through less frequent painting and decorating, since dust and dirt are prevented from settling through the store because of the filtration system.

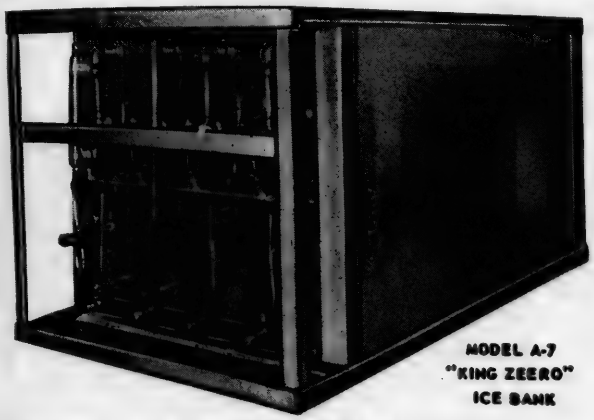
"King Zeero's" Sweet Water ICE BANKS offer ICE-CONCENTRATED Refrigeration for Air Conditioning

CONTINUOUS RIFLED GALVANIZED COILS
EXPANSION VALVE CONTROLLED

32°-34° COLD ICE WATER

DESIGNED FOR USE WITH:
FREON — METHYL CHLORIDE — AMMONIA

The "King Zeero" ICE BANK is designed for air cooling in Churches, Mortuaries, Theatres, Offices, Stores, Auditoriums, Factories, Clubs, Restaurants, etc. Ice Banks may be added to existing systems for increased capacity.



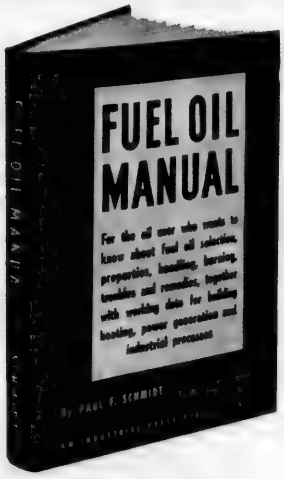
MODEL A-7
"KING ZEERO"
ICE BANK

CAPACITIES - 500 lbs. to 30,000 lbs. (72,000 B.T.U.'s to 4,320,000 B.T.U.'s) in a single unit. Multiple units may be installed.

The "King Zeero" ICE BANK is designed to deliver tons of 32 to 34 F. ice water for recirculation through air cooling coils. Peak loads many times compressor capacity are easily handled.

- DIRECTED COURSE OF WATER travels with "built-in" agitation.
- NO MECHANICAL AGITATION REQUIRED.
- LARGE WATER COMPARTMENTS spaced on 11" and 12" centers.
- 33% EXTRA ICE CAPACITY safely attained without freezing up.
- ICE IS "BURNED OFF" PLATE COILS progressively, exposing prime and secondary surface for maximum flash cooling capacity.
- ICE THICKNESS automatically controlled - eliminates "freeze ups."
- 94 SIZES to fit space requirements. Other designs for special applications.

THE KING ZEERO COMPANY
4300-14 W. Montrose Ave. - Chicago 41, Ill.
Manufacturers of Ice Builders - Ice Builder Cabinets - Ice Banks


FUEL OIL
MANUAL
For the oil man who wants to know about Fuel oil selection, preparation, handling, burning, troubles and remedies, together with working data for boiler heating, power generation and industrial processes
By PAUL E. SCHMIDT

Here is a book that will give you a comprehensive picture of the characteristics and uses of every type and grade of fuel oil. The author explains the meaning of each oily property, and shows how this information is applied to the selection, handling and burning of fuel oil. Impurities and how they effect combustion are described fully, and a special chapter describes fuel oil additives and how they are used. Another chapter lists troubles which may be encountered in using fuel oils, and shows the correct remedy to apply in each case. Technical language is avoided wherever possible and all terms are fully explained.

160 Pages **$3.50** 34 Tables

In Canada or overseas, $4.20

THE INDUSTRIAL PRESS
93 Worth Street **New York 13, N. Y.**

THE WEATHER-CHRON
NEW WEATHER RESET TIME SWITCH

Automatic, positive heat control that no other system can offer!

Outguesses the weather!

The time of shift from *night* to *day* thermostat changes automatically with every degree change in outdoor temperature. The WEATHER-CHRON has a temperature-sensitive bulb like that of an indoor-outdoor thermometer which is placed outdoors where it constantly measures outdoor temperatures. Instead of just showing what the outdoor temperature is, the WEATHER-CHRON

- **Changes the time heating starts as outside temperatures change.**
- **Permits the thermostat (all types) to control heat flow during the day.**
- **Stops heat flow as outdoor temperatures rise above 65° F.**
- **Shuts down heating earlier in mild weather — later in cold weather.**
- **Turns heat back on at night when outdoor temperature drops below selected levels.**

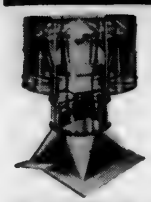
Specify
WEATHER-CHRON
for your protection, for the best interests of your customers.

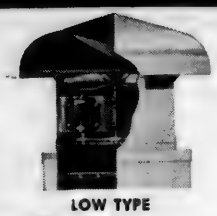
Write today for complete information

AUTOMATIC DEVICES CO., INC.
714 Hillgrove Ave. • Western Springs, Ill.

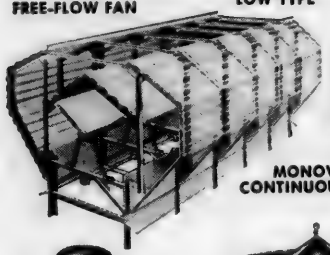
Burt

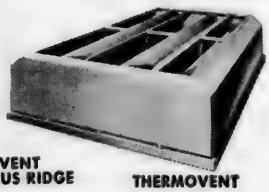
ROOF VENTILATORS
WALL LOUVERS


FREE-FLOW FAN


LOW TYPE

FREE EXHAUST FAN

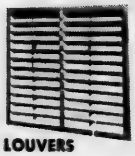

MONOVENT CONTINUOUS RIDGE


THERMOVENT

CENTRIFLOW

STANDARD GRAVITY

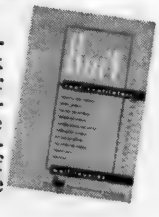
FREE-FLOW GRAVITY


LOUVERS

MONITOR TYPE

SEND FOR FREE DATA BOOK

BURT'S complete ventilator line includes a type and size to put air to work most efficiently and economically for your specialized needs. BURT'S engineering skill and know-how from more than half a century designing and building ventilators is your assurance of satisfaction. Your inquiry will receive prompt and qualified attention.



FAN & GRAVITY VENTILATORS LOUVERS • SHEET METAL SPECIALTIES

The Burt Manufacturing Company

49 E. South St., Akron 11, Ohio

MEMBER POWER FAN MANUFACTURERS ASSOCIATION

BOOK REVIEWS

Publications abstracted in this department should be ordered direct from publisher

MODERN SOLAR CONTROL

Technology and esthetics of sun shading devices for commercial, industrial, and residential buildings are reviewed by Olgay & Olgay, two brothers from Budapest, presently holders of Guggenheim Fellowships at Princeton Architectural Laboratory. Their work in Hungary and the United States is among those illustrated.

After a discussion of the history of sun shading of buildings, the authors treat methods of calculating position and intensity of solar heat and how to select a proper shading device. Application of the shade-dial, effect of natural and man-made obstructions to the sun, and use of the radiation calculator are covered.

A chapter is devoted to the economics of shading devices, comparing savings in air conditioning with cost of sun shades. Then the authors summarize the previous theoretical discussion with a step-by-step solution in the design of the factory for Universal Corporation, Dallas, Tex., of which Aladar Olgay was the architect.

Finally, over 100 examples of contemporary architecture are illustrated. Written for architects, there is much in the book of interest to the heating and air conditioning engineer.

Solar Control & Shading Devices, by Olgay & Olgay. Cloth bound, 11 x 8½ inches, 202 pages. Published by Princeton University Press, Princeton, N. J. Price $12.50.

• • •

CONFERENCE ON STEAM AND WATER HEATING AND SUMMER COOLING—Proceedings have been issued of the May, 1956 Engineering Conference, Steam and Water Heating and Summer Cooling, that was held at the University of Illinois, Urbana, Ill. This conference was conducted by the extension division of the university in cooperation with The Institute of Boiler and Radiator Manufacturers. University of Illinois, Division of University Extension, 725 S. Wright St., Champaign, Ill.

GAS APPLIANCE VENTING CONDITIONS, PART 2—Information on the effects of atmospheric wind conditions on vent operation is contained in AGA Laboratories research report No. 1267 on A Field Survey of Gas Appliance Venting Conditions, Part 2. It presents an analysis of flow conditions which exist in an operating vent system. American Gas Association, 420 Lexington Ave., New York 17, N. Y. Price, $2.

DRAFTING SYMBOLS—A proposed section has been completed on electrical diagrams, as part of a manual on American drafting standards. The standards presented are tentative and are subject to revision. For a free copy write to The American Society of Mechanical Engineers, 29 W. 39th St., New York 18, N. Y.

(Continued on page 154)

Airsan Viro Crimp
HIGH VELOCITY AIR FILTERS

VIRO CRIMP MEDIA
has special Hemmed Edges for strength and safe, easy handling. No cuts! No Scratches! No Filter surface damage.

- MAXIMUM EFFICIENCY (288 — 510 FPM)
- MINIMUM RESISTANCE
- NO DIRECT AIR PASSAGE
- LARGE DUST HOLDING CAPACITY

Also Available . . .
Low Velocity and Grease Filters.
Write for catalogs and prices.

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Canadian Representative
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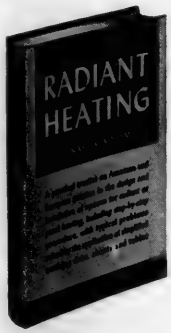

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RADIATION SAFETY — A comprehensive report has been issued by the U. S. Atomic Energy Commission on Radiation Safety and Major Activities in the Atomic Energy Programs covering the period from July to December, 1956. It is chiefly devoted to civilian applications of atomic energy, reactor development, physical research, biology and medicine, radiation safety in atomic energy activities, and research programs on radiation effects and treatments. This paper-bound, 396-page book may be purchased from the Supt. of Documents, U. S. Government Printing Office, Washington 25, D. C. Price, $1.25.

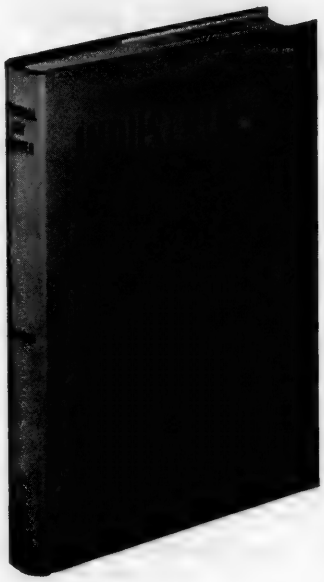
STUDY OF AIR POLLUTION—In cooperation with the State of Washington Department of Health and U. S. Department of Health, Education and Welfare, a spiral bound book of 145 pages was printed on Evaluation of Air Pollution in the State of Washington. After a general presentation of the problem, the authors discuss groups of communities in the small community classification, population from 4,000 to 10,000, and the large cities with population over 10,000. For a free copy write to Community Air Pollution Program, Robert A. Taft Sanitary Engineering Center, 4676 Columbia Parkway, Cincinnati 26, Ohio.

INDUSTRIAL OVENS AND DRYERS—As a result of thirty years of study, investigation and testing, the Factory Mutual Engineering Division has published a 40-page booklet on Industrial Ovens and Dryers in an effort to cut down on explosions and fires. It has data for the men who design, install, buy or operate such units. Factory Mutual Engineering Division, 1151 Boston-Providence Turnpike, P. O. Box 510, Norwood, Mass. Price $1.

STANDARDS ON THERMAL INSULATING MATERIALS—An assembly of ASTM standards on thermal insulating materials is offered in one volume by ASTM Committee C-16. Included are 55 ASTM specifications, methods of tests, methods of sampling, recommended practices, and a list of definitions. American Society for Testing Materials, 1916 Race St., Philadelphia 3, Pa. Price, $3.

CONSULTING AND DESIGN ENGINEERING PRACTICES — A committee of the Michigan Engineering Society has prepared a Manual of Consulting and Design Engineering Practices to assist design and consulting engineers and their clients in preparing an agreement for engineering services. The basis of determining fees are in general agreement with similar information published by several national and state engineering societies. Michigan Engineering Society, P. O. Box 573, Kalamazoo, Mich; 50c.

WARM AIR FURNACES—Commercial Standard CS195-57 on Warm Air Furnaces Equipped with Pressure Atomizing or Rotary Type Oil Burners (second edition) has been issued by the U. S. Department of Commerce. It is a revision of a commercial standard issued in 1954. It also covers requirements for combination units which are intended for both heating and cooling. U. S. Dept. of Commerce, Office of Technical Services, Washington 25, D. C.



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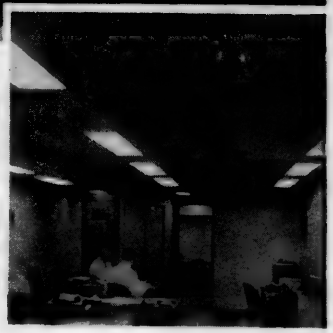

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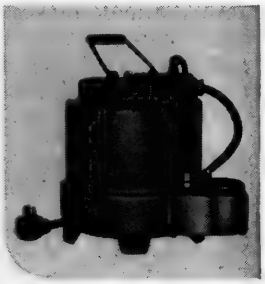

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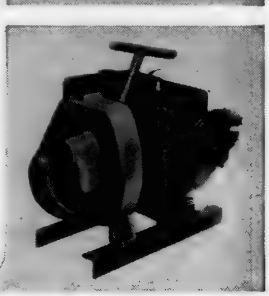

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COMING EVENTS

Where listed, names or titles of individuals are those from whom further information is available

AGA CONFERENCE—Annual Accident Prevention Conference of the American Gas Association, at the Sheraton-Jefferson Hotel, St. Louis, Mo. Secretary of the Association, 420 Lexington Ave., New York, N. Y. ..... **SEPTEMBER 16-18, 1957.**

STANDARDS ENGINEERS MEETING—Sixth annual meeting of the Standards Engineers Society, at the Hotel Commodore, New York, N. Y. R. E. Mason, Public Relations Chairman, Room 2624, 70 E. 45th St., New York 17, N. Y. ..... **SEPTEMBER 23-25, 1957.**

AGA MEETING—Annual convention, American Gas Association, Kiel Auditorium, St. Louis, Mo. AGA, 420 Lexington Ave., New York, N. Y. ..... **OCTOBER 7-9, 1957.**

NATIONAL SAFETY COUNCIL EXPOSITION—45th National Safety Congress & Exposition, to be held in Chicago, Ill. Headquarters not yet announced. Secretary of the National Safety Council, 425 N. Michigan Ave., Chicago, Ill. ..... **OCTOBER 21-25, 1957.**

AIR POLLUTION CONFERENCE—Air Pollution Conference, to be held in Chicago, Ill. Headquarters not yet announced. Co-sponsored by Armour Research Foundation and the Midwestern Air Pollution Prevention Association. Conference secretary of Armour Research, 10 W. 35th St., Chicago 16, Ill. ..... **NOVEMBER 13-14, 1957.**

ASRE MEETING—Semi-annual meeting of the American Society of Refrigerating Engineers, at the Hotel Shoreland, Chicago, Ill. Secretary of the Society, 234 Fifth Ave., New York 1, N. Y. ..... **NOVEMBER 14-16, 1957.**

REFRIGERATION CONTRACTORS CONVENTION—Annual convention of the Refrigeration and Air Conditioning Contractors Association, Inc., at the Drake Hotel, Chicago, Ill. Secretary of the Association, 10660 Carnegie Ave., Cleveland 6, Ohio. ..... **NOVEMBER 16-18, 1957.**

REFRIGERATION WHOLESALERS MEETING—Annual meeting, Air Conditioning and Refrigeration Wholesalers, Sheraton Hotel, Chicago, Ill. Secretary, 2607 N. High St., Columbus, Ohio. ..... **NOVEMBER 16-18, 1957.**

AIR-CONDITIONING AND REFRIGERATION EXPOSITION — 10th exposition of the Air-Conditioning and Refrigeration industry, sponsored by the Air-Conditioning and Refrigeration Institute, at Chicago's International Amphitheatre, Chicago, Ill. Secretary of the Institute, 1346 Connecticut Ave., N. W., Washington 6, D. C. ..... **NOVEMBER 18-21, 1957.**

WARM AIR HEATING—Annual convention, National Warm Air Heating and Air Conditioning Association, Hotel Morrison, Chicago, Ill. George Boedener, Secretary, NWAHACA, 640 Engineers Bldg., Cleveland, Ohio ..... **NOVEMBER 18-22, 1957.**

ASME MEETING—Annual meeting of the American Society of Mechanical Engineers, at the Hotel Statler, New York, N. Y. Secretary of the Society, 29 W. 39th St., New York, N. Y. ..... **DECEMBER 1-6, 1957.**

ASHAE WINTER MEETING — 64th annual meeting, American Society of Heating and Air-Conditioning Engineers, Pittsburgh, Pa. A. V. Hutchinson, secretary ASHAE, 62 Worth St., New York, N. Y. ..... **JANUARY 27-29, 1958.**

NACE CONFERENCE—14th annual conference of the National Association of Corrosion Engineers, at the Civic Auditorium, San Francisco, Calif. A. B. Campbell, executive secretary of the Association, 1061 M & M Bldg., Houston 2, Texas. **MARCH 17-21, 1957.**

NUCLEAR CONGRESS—1958 Nuclear Engineering and Science Conference in Chicago, Ill. Engineers Joint Council, 29 W. 39th St., New York 18, N. Y. ..... **MARCH 17-21, 1958.**

JOINT ASHAE-ASRE MEETING—Joint summer meeting, American Society Heating and Air-Conditioning Engineers and American Society Refrigerating Engineers, Hotel Leamington, Minneapolis, Minn. ..... **JUNE 23-25, 1958.**

EXPOSITION AND ASHAE CONVENTION—65th annual meeting, American Society Heating and Air-Conditioning Engineers (Jan. 26-29, 1959) and 14th International Heating and Air Conditioning Exposition, Philadelphia, Pa. ..... **JANUARY 26-30, 1959.**

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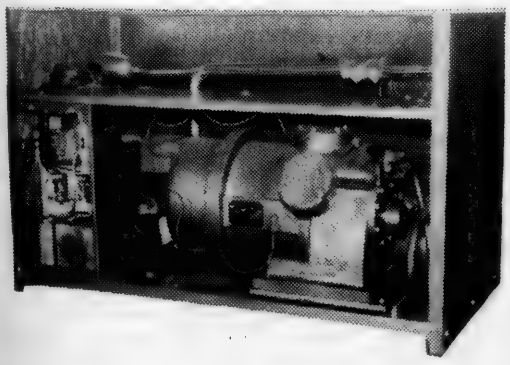

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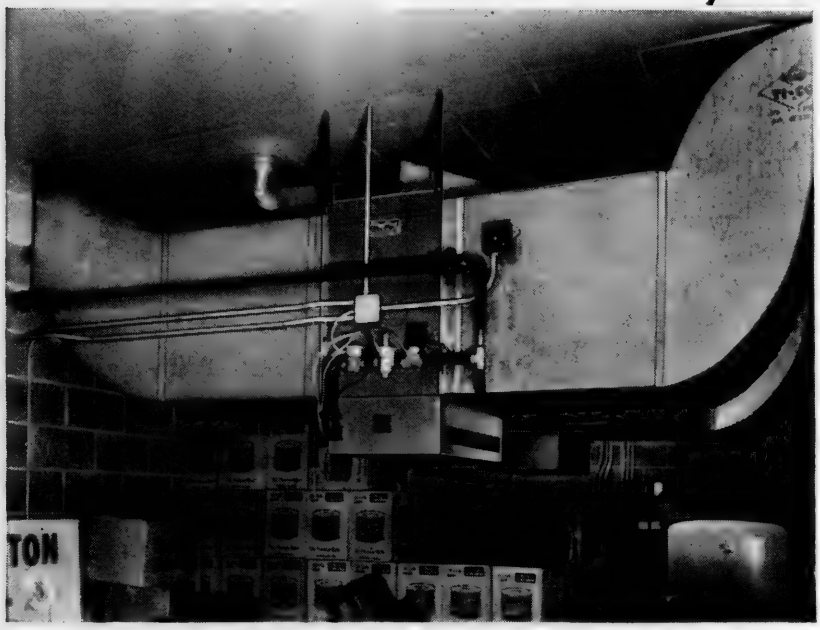

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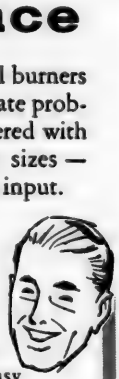

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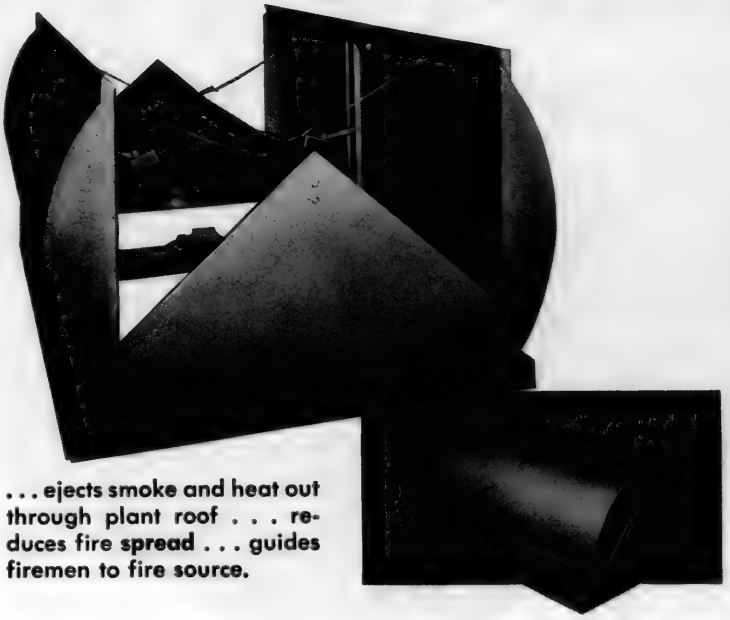

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* Advertiser appeared in previous issue.

Below and on the following pages are given brief digests of the advertisements appearing in this month's issue. Use this Digest to locate and refer to the advertisements in which you are particularly interested, then fill out and mail the prepaid postcard to request further information from manufacturers.

The items appear in the same order as the advertisements to which they refer, to facilitate obtaining further information after reading an advertisement. NOTE: All advertisements are digested here except those received too late for inclusion. The Index of Advertisers lists all the advertisements in this issue.

Use the postcard below for catalogs, new equipment and materials, as well as Ad-Digest items.

PRESSURE RELIEF VALVES
This company's ASME-rated pressure relief valves set top standards in engineering with quality construction, double safe design and a wide range of capacities. Bulletin is available.
Inside Front Cover — Item 200

BONDED FAN RATINGS
Manufacturer's fan ratings are dependable to the extent that they are now bonded as to performance by the American Surety Company. Information is available.
Page 1 — Item 201

FREON COOLERS AND CONDENSERS
This company makes a complete line of flooded and dry expansion type Freon coolers as well as Freon condensers. Their equipment is part of one of the largest automatic cascade refrigeration systems ever built, now operating full time at the Hoffmann-La Roche plant in Nutley, N. J. Bulletin is available.
Page 5 — Item 202

MULTIPLE ALUMINUM INSULATION
A mystery concerning wetness in a home which persisted even during long spells of dry weather was finally solved by the installation of scientific multiple aluminum insulation, which indicated that the culprit had been flow of water vapor from a seemingly dry ground. Two publications are available.
Page 7 — Item 203

WROUGHT IRON PIPE
Standing guard against corrosion, wrought iron chilled water lines assure uninterrupted cooling facilities for Continental National Bank in Houston, Texas. Booklet is available.
Page 9 — Item 204

DIAPHRAGM FLUSH VALVES
A dramatically detailed highschool structure in Idaho includes among its many worthwhile features the company's diaphragm type flush valves, durable as the rocky hills that surround the project. Catalog is available.
Page 11 — Item 205

HEAT EXCHANGE INFORMATION
There are many factors that affect the efficiency, maintenance and service life of heat exchange coils. For best performance in your own application, the practical approach is to take advantage of the engineering research and design skill which accompany offer. Information is available.
Page 13 — Item 206

CENTRIFUGAL REFRIGERATION
Machines were used in Philadelphia's Sheraton Hotel on the basis of their high capacity, vibration-free performance, and company's reputation in air-conditioning field. Supply 1,000 units with chilled water. Information available.
Page 14 — Item 207

BAROMETRIC DRAFT CONTROLS
When a draft inducer is used to assist a faulty chimney or to permit modern low stack construction a barometric draft control should also be installed. Technical data are available.
Page 15 — Item 208

DUAL FUEL BURNER
Research by company engineers has resulted in the development of the first dual fuel burner specifically designed for use in a direct fired space heater. It burns light oil, heavy oil, or gas with equal efficiency. Bulletin is available.
Pages 16-17 — Item 209

INTERIOR FIRE PROTECTION
Of the company's many available models, the two pictured in ad are the most popular for interior fire protection in schools and churches. Catalog is available.
Pages 18-19 — Item 210

BACKWARD CURVE BLOWERS
Company controls entire production of their versatile blower from drawing board to finished product. It is guaranteed unconditionally for quiet, trouble-free operation. Bulletins are available.
Page 20 — Item 211

ONE-PIECE PIPE INSULATION
This one-piece, snap-on type pipe insulation has no equal in thermal efficiency for cold and heated piping and no equal for low installation costs. Information is available.
Page 21 — Item 212

CENTRAL CONTROL PANEL
This company has taken the next logical step in central control panel development by means of a floor plan projection system coordinated with controls and dials which are automatically switched to correspond with a particular floor plan. Information is available.
Pages 22-23 — Item 213

DUAL-DUCT BLENDER
For high velocity air conditioning controls volume and holds temperatures without the chance of robbing another space as one space demands more warmth or cooling. Air volume held constant by device that uses the same air for its power. Information available.
Pages 24-25 — Item 214

STEEL PIPE
New York's Coliseum, the building that "has everything", has more than 376 tons of the manufacturer's steel pipe in its heating and air conditioning systems. Information is available.
Page 26 — Item 215

AIR HANDLING DEVICES
The manufacturer's two lines of air handling devices, including high velocity regulating units, diffusers, filters, and exhausters, are readily available to solve all your handling requirements. Information is available.
Page 27 — Item 216

GRILLES AND DIFFUSERS
Cartoon characters are pleased with fast delivery and lower prices of the company's standard sizes of grilles, registers and ceiling diffusers. Information is available.
Pages 28-29 — Item 217

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information

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PLEASE PRINT Sept. H-57

This service available only to U.S. and Canadian readers.

Name .....

Firm .....

Nature of Firm's Business .....

Street .....

City .....**Zone** ....**State** .....

This card is void after Dec. 1, 1957

Ad-Digest

BASEBOARD RADIATION
Two types of high capacity commercial baseboard radiation are available from the manufacturer; one features copper tube with aluminum fins, the other steel tube with steel fins. Information is available.
Page 30 Item 218

INDUSTRIAL, INSTITUTIONAL FANS
Company's type BL fans are known for their low noise level, endurance, and efficiency in heavy-duty industrial applications; their stability under broad variations of pressure and volume requirements; for big Class I air handling jobs. Bulletin is available.
Page 31 Item 219

AIR-COOLED CONDENSER
Company's air-cooled condenser plus year-round automatic head pressure control guarantees maximum pressure at expansion valve in winter, maximum summer capacity, prompt defrosting, immediate compressor start-up. Bulletin available.
Page 32 Item 220

REFIGERANTS
Selected physical data are presented for company's line of refrigerants for every need. Product is dry, pure, and consistently surpasses manufacturing specifications. Bulletin available.
Page 33 Item 221

AIR FILTERS
Economical and light weight aluminum filters are available for residential, commercial or industrial applications. Ideal for new or existing installations, they reduce operating costs through longer service life and top performance. Information is available.
Page 34 Item 222

MOTOR-PUMP UNITS
By standardizing on this company's motorpumps you offer your customers pumps designed specifically for air conditioning systems. Thousands are in trouble-free operation today. Literature reviews ¼ to 75-hp line.
Page 35 Item 223

GLASS FIBER AIR FILTERS
Disposable filters, replaced regularly, solved two vexing problems at newspaper printing plant. Ink mist and paper dust no longer foul press unit drive motors through their intakes, nor does ink condense in air ducts. Information available.
Page 36 Item 224

FUEL OIL PRE-HEATER
Number one in a series of idea sheets from this company describes use of secondary stream to pre-heat heavy fuel oil in a high temperature hot system. Additional data is available.
Page 37 Item 225

TEMPERATURE CONTROLS
Year-round air conditioning regulated by the company's individual-room pneumatic temperature controls provides the right temperature required for every hospital activity in St. Boniface Hospital, Canada's first completely air conditioned hospital. Information is available.
Pages 38-39 Item 226

SPACE HEATER
The company's versatile space heater permits heating and mixing of any desired combination of outside and recirculated air to meet in heating and ventilating requirements. Information is available.
Pages 40-41 Item 227

AIR CONTROL AND DISTRIBUTION
This company offers one source and one responsibility for both temperature control and air distribution systems, selected and adjusted for ideal comfort by means of a company-developed Comfort Chart. Bulletin is available.
Pages 42-43 Item 228

INDIVIDUAL ROOM HEATING
Every type of building or home can now have individual room temperature control at a cost comparable to that of many steam or hot water systems which do not make each room a separate heating zone. Information is available.
Page 44 Item 229

HEATING AND COOLING COILS
The new, completely air conditioned Tishman Building in Los Angeles is an example of the versatility of the manufacturer's heating and cooling coils. It was necessary to design this flexible system so that it would meet the space requirements of future tenants as the building became leased. Information is available.
Page 45 Item 230

SINGLE PHASE MOTOR
The company's high starting torque, integral horsepower, single phase motor is now available in the latest NEMA frame sizes. Information is available.
Page 46 Item 231

IMPULSE STEAM TRAPS
The manufacturer's impulse steam traps have been used in the Beth Israel Hospital of Newark, N. J. for the last twenty years. Serving varied equipment from laundry to operating rooms, traps have proved easy to install and simple to maintain. Booklet on steam trapping is available.
Page 47 Item 232

ALUMINUM COIL SHEET
When choosing aluminum coil sheet for heat transfer products manufacturers demand good drawing quality for rapid forming of tube collars without cracking or buckling. The low cost, highly efficient product of this company satisfies these requirements. Information is available.
Page 48 Item 233

HEATING PUMPS
The company manufactures a pump to meet every heating requirement. Available are condensate, vacuum, turbine, and vertical pumps. Descriptive bulletins on each type are available.
Page 49 Item 234

YEAR 'ROUND AIR CONDITIONING
The company's line of year 'round room air conditioners is available in cabinet or recessed models, vertical or horizontal models, combination water cooling and heating coils, combination direct expansion and steam coils, and three control kits. Information is available.
Page 51 Item 235

GLASS FIBER INSULATION
The company's flexible glass fiber insulation is used by Airtemp Division of Chrysler Corporation for air conditioning and heatng units to prevent condensation or heat transfer at metal cabinet walls. Information is available.
Page 52 Item 236

POWER EXHAUSTERS
This company introduced ten years ago a power exhauster with low contour, spun aluminum design. Still on the move, the company offers stainless steel U-spring vibration isolators for low vibration transmission. Information is available.
Page 53 Item 237

PNEUMATIC CONTROL SYSTEM
The company's pneumatic control system solves varied temperature regulation problems at one of the world's largest air conditioned industrial plants, the Convair Division of General Dynamics Corporation. A key feature of this system is a central control which provides the flexibility needed to heat, cool and ventilate the buildings efficiently. Information is available.
Pages 54-55 Item 238

STEAM HUMIDIFIERS
These steam humidifiers give large humidifying capacity at low cost by discharging clean, dry steam directly into room atmosphere or into air stream in ducts or plenums. Control is by accurate humidistats. Sixteen-page bulletin is available.
Page 56 Item 239

MODERN COAL BURNING
Modern coal handling and burning cut steam costs 10% for Bucyrus-Erie Company, South Milwaukee, Wisconsin. Additional case histories on burning coal the modern way are available.
Page 57 Item 240

SHOWER MIXING VALVE
Available from this manufacturer is the industry's first completely recessed thermostatic shower mixing valve. Device provides greater showering comfort in complete safety. Information is available.
Page 58 Item 241

Postage Will be paid by Addressee

No Postage Stamp Necessary If Mailed in the U. S.

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING
93 WORTH STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE

Ad-Digest

WELDED TUBING
One home refrigerator with a reputation for silence and long service life depends upon this manufacturer's electric-resistance-welded tubing for efficient operation of the refrigerator. Information is available.
Page 59 — Item 242

COOLING TOWER LINE
The addition of the 80 and 100-ton capacity cooling towers extends the range of the company line. Features include increased corrosion resistance and very quiet operation. Details are available.
Page 111 — Item 243

PREFABRICATED COPPER TUBE
In the Statler Hilton Hotel at Dallas, Texas, 60,000 lb of the company's copper water tube, in diameters ranging from ⅜ to 2½ inches, were installed in hot and cold water plumbing lines and chilled water lines for air conditioning. Prefabrication of sub-assemblies saved many hours of installation time. Information is available.
Page 113 — Item 244

AIR FILTERS
The glass fiber air filters manufactured by this company have a lighter-to-heavier density of filter media from front to back. The filters are being planned for a new surgical dressings research and manufacturing plant. Information is available.
Page 115 — Item 245

HEATING EQUIPMENT
Manufacturer's concept of one source—one responsibility for heating equipment was accepted by designers and contractors for new children's hospital in St. Louis, Mo. Information is available.
Page 117 — Item 246

AIR CONDITIONING SYSTEM
Manufacturer's zone-by-zone method, consisting of ceiling and floor-mounted units, was selected for the world's first fully air conditioned men's clothing plant, H. Daroff & Sons, Philadelphia, Pa. Information is available.
Page 119 — Item 247

STEEL PIPE
Advertisement describes manufacturer's distribution system and states that highest quality steel pipe is provided at the right price by coordinating distribution with mill production. Information is available.
Page 121 — Item 248

UNIT HEATERS
Available as either vertical or horizontal units, these unit heaters give a choice of steam or hot water coils plus a wide range of sizes and capacities. Information is available.
Page 125 — Item 249

INDUSTRIAL FANS
These industrial fans, designed for high volume air movement against resistances up to ¾-inch static pressure, feature wide, 4-ply airfoil propellers. The fans are available in ring, duct, or square panel types. Bulletins are available.
Page 127 — Item 250

REFRIGERATION VALVES
The company's line of valves designed for refrigeration and other high pressure services feature in-service repacking, tight closure, and large handwheel. Information is available.
Page 127 — Item 251

DIRECT FIRED HEAT DIFFUSERS
To heat the two million cubic feet of storage and production space in its Chicago plant Luria Engineering Company chose six one-million Btu per hr direct fired heat diffusers. Units are completely self-contained, and cost less to own, install and operate. Information is available.
Page 129 — Item 252

POWER EXHAUSTER
With applications in industry, institutional and commercial buildings, and residential construction, these power exhausters feature no motors, fans or bearings in line with the exhaust and acid resisting, vitreous enamel finish. Units are also available in stainless steel or PVC. Engineering data is available.
Page 129 — Item 253

GALVANIZED SHEETS
Manufacturer's zinc coated galvanized sheets are soft and ductile, easy to form, and are almost impossible to chip or flake regardless of severity of fabrication. Information is available.
Page 131 — Item 254

DRAFT INDUCERS
These motorized draft inducers provide positive, uniform and adequate draft for boilers and air furnaces completely independent of weather conditions. In addition, they save money through higher fuel burning efficiencies. Bulletin is available.
Page 132 — Item 255

LINE OF VALVES
To control much of the complex piping system in the nation's largest integrated woolen mill in Barnwell, S. C., the manufacturer's valves in a wide variety of sizes and types were a unanimous choice of management and engineers. Information is available.
Page 133 — Item 256

HEAVY DUTY BOILERS
There is a heavy duty, copper tube boiler in this manufacturer's line for every steam or water heating application up to 1.8 million Btu per hr output. Information is available.
Page 134 — Item 257

GAS FIRED DUCT FURNACES
This versatile furnace is especially suitable for use with cooling coils and packaged air conditioners. Stainless steel burners and heat exchangers prevent the rust and corrosion problems of conventional units. Bulletin is available.
Page 135 — Item 258

SECTIONAL DUCT FURNACES
These sectional duct furnaces free the designer from the limitations imposed by packaged heating equipment. A heating or heating-cooling system designed around a duct furnace can be matched to exact job requirements. Information is available.
Page 136 — Item 259

CENTRIFUGAL FANS
The manufacturer's centrifugal fans feature air foil blading which has proved its effectiveness in six years of operation by 200 customers in mechanical draft, industrial process and high pressure air conditioning. Sizes cover every requirement up to 700,000 cfm. Catalog is available.
Pages 138-139 — Item 260

REVOLVING UNIT HEATERS
In these revolving discharge unit heaters the heated air is discharged from slowly revolving outlets warming those in its circular path for a few seconds at a time, eliminating steady blasts of heat. Bulletin is available.
Page 140 — Item 261

ELECTROSTATIC PRECIPITATOR
Besides being one of the outstanding architectural designs of this decade, Price Tower in Oklahoma sets the pace in clean air comfort also. Ventilation air in this building is cleaned by manufacturer's automatc electrostatic precipitator. Bulletin is available.
Page 141 — Item 262

GENERAL SERVICE PUMPS
Double shaft seals and sealed ball bearings, standard equipment on these general service pumps, do away with stuffing box attention and bearing lubrication. Information is available.
Page 142 — Item 263

AIR CONDITIONING EQUIPMENT
This manufacturer's equipment was chosen for the air handling and conditioning of a virtually window-walled building at Radnor, Pa., serving Wyeth Laboratories, Inc. Information is available.
Page 143 — Item 264

Circle numbers corresponding to the items and advertisements in which you are interested, print your name and address clearly. Information will be sent directly from manufacturers.

INQUIRY CARD

Circle below item numbers on which you wish catalogs or further information

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PLEASE PRINT Sept. H-57

This service available only to U.S. and Canadian readers.

Name .....

Firm .....

Nature of Firm's Business .....

Street .....

City .....**Zone** ....**State** .....

This card is void after Dec. 1, 1957

Ad-Digest

FLEXIBLE HOSE
Extremely flexible, durable and light weight, this flexible hose is adaptable for all kinds of fume and dust control and ventilation uses. Information is available.
Page 144 Item 265

CIRCULATING PUMPS
Engineers have chosen this company's pumps many times for heating and air conditioning systems. They are compact, easy to install and maintain, and give many years of dependable service. Line includes hot water circulating pumps and condensate return pumps. Information is available.
Page 145 Item 266

ELECTRIC AIR DUCT HEATERS
For heating air under forced circulation these electric air duct heaters are an efficient, economical answer. Heaters can be installed easily in round or rectangular ducts and accurately controlled either manually or by automatic thermostat. Bulletin is available.
Page 145 Item 267

BURNERS FOR GAS OR OIL
These gas or oil burners combine low installation and maintenance costs with added years of dependable service. Information is available.
Page 145 Item 268

WATER COOLERS
Three distinctive lines of water coolers from this company offer features including non-jamming foot pedal, fully sealed refrigeration system and 7-point thermostat. Bulletin is available.
Page 146 Item 269

MOTEL AIR CONDITIONING
Manufacturer's equipment for motel air conditioning wins praise from president-manager of the new Shreveporter Highway Hotel. Literature is available.
Page 147 Item 270

BOILER WATER LEVEL CONTROLS
Manufacturer believes their boiler water level controls to be the safest as well as simplest devises available. Operating life is almost unlimited. Catalog is available.
Page 147 Item 271

CONTROLLED HUMIDITY
Air conditioning method removes moisture from air by contact with a liquid in a small spray chamber. Heating and cooling separate. Precise humidity under any conditions. Bulletins available.
Page 148 Item 272

FLEXIBLE DUCT CONNECTOR
Available in handy 25, 50, or 100 ft rolls, the manufacturer's product makes fabrication of any type of flexible duct connector easy. Catalog is available.
Page 149 Item 273

AUTOMATIC SHUTTER FOR BLOWERS
The manufacturer's automatic shutter is self-contained in adapter sleeve for attachment to unit blower. Louvers are of light gage aluminum with felt silencer strips. Catalog is available.
Page 149 Item 274

FORCED DRAFT COOLING TOWERS
Three sales representatives are listed for this manufacturer of forced draft cooling towers. The name of your nearest representative is available.
Page 149 Item 275

STEAM HEATING COILS
Steam distributing tube heating coils of this manufacturer have all tube outlets from he header extruded to provide double thickness for tube insertions. The tubes are fabricated from 0.035-in. copper; nipple connections are brass. Catalog is available.
Page 149 Item 276

CENTRIFUGAL ROOF EXHAUSTERS
These quiet operating centrifugal roof exhausters are expressly suited for schools, hospitals and public and commercial buildings where sound levels must be held to a minimum. Bulletin available.
Page 150 Item 277

WEATHER RESET TIME SWITCH
This weather reset time switch has automatic, positive heat control that no other system can offer. The time of shift from night to day thermostat changes automatically with every degree change in outdoor temperature. Information is available.
Page 151 Item 278

ICE BANKS
Sweet water ice banks are designed by this manufacturer to deliver tons of 32 to 34-deg F ice water for recirculation through air cooling coils in air conditioning systems. Designed for use with Freon, methyl chloride, or ammonia, the banks may be added to existing systems for increased capacity. Information is available.
Page 151 Item [illegible]

VENTILATOR LINE
The manufacturer's complete ventilator line includes a type and size to put air to work most efficiently and economically for any specialized needs. Data book available.
Page 152 Item [illegible]

HIGH VELOCITY AIR FILTERS
These filter media have special hemmed edges for strength and safe, easy handling. They have a maximum efficiency from 288 to 510 fpm. Low velocity oil grease filters are also made. Catalog available.
Page 153 Item [illegible]

GALVANIZED WATER HEATERS
These galvanized water heaters have recovery rates ranging from 107 to [illegible] gph. They are available in 13 sizes and are gas or oil fired. Bulletin is available.
Page 153 Item [illegible]

FORCED DRAFT COOLING TOWERS
Additional sales representatives are listed for this manufacturer of forced draft cooling towers. The name of your nearest representative is available.
Page 153 Item [illegible]

REGISTERS AND GRILLES
Three models of return air registers and grilles are described and illustrated in this ad. Additional information is available from the company in a catalog.
Page 154 Item [illegible]

RADIANT ACOUSTICAL CEILING
Economy is now possible with this integrated radiant acoustical ceiling. All radiant duct, aluminum acoustical panels, diffuser panels and framing for recessed fixtures are supplied. Booklet available.
Page 155 Item [illegible]

PUMP LINE
Manufacturer has pumps for every application including coolant circulation, liquid transfer, sumps, septic tanks, water supply and many others. Information on complete line is available.
Page 156 Item [illegible]

POWER ROOF EXHAUSTERS
These power roof exhausters offer low silhouette appearance, heavy duty construction, and quiet operation. Information is available.
Page 157 Item [illegible]

GAS FIRED DUCT FURNACES
This versatile furnace is especially suitable for use with cooling coils and packaged air conditioners. Stainless steel burners and heat exchangers prevent the rust and corrosion problems of conventional units. Bulletin is available.
Page 158 Item [illegible]

FIRE ESCAPE VENT
Company's product is an effective answer to fires that billow up and spread under closed roofs. When heat melts a fusible link, a 28 sq ft vent for smoke and flames is opened. Bulletin is available.
Page 159 Item [illegible]

MERCURY SWITCH CONTROLS
These controls in weather proof, explosion proof, and general purpose models are built to last the life of the equipment they serve. All controls incorporate sealed mercury contacts. Catalog available.
Page 160 Item [illegible]

FILTER-DRIER
Company's new pressure-sealed filter-drier features high capacity, low pressure drop, large filter area, and high working pressure. Information is available.
Inside Back Cover Item [illegible]

BOILER HEAT
Manufacturer praises boiler heat, and believes it, as well as the entire heating industry, should be promoted in the imaginative manner with which the auto industry describes its wares. Information is available on boiler safety controls.
Back Cover Item [illegible]

Postage Will be paid by Addressee

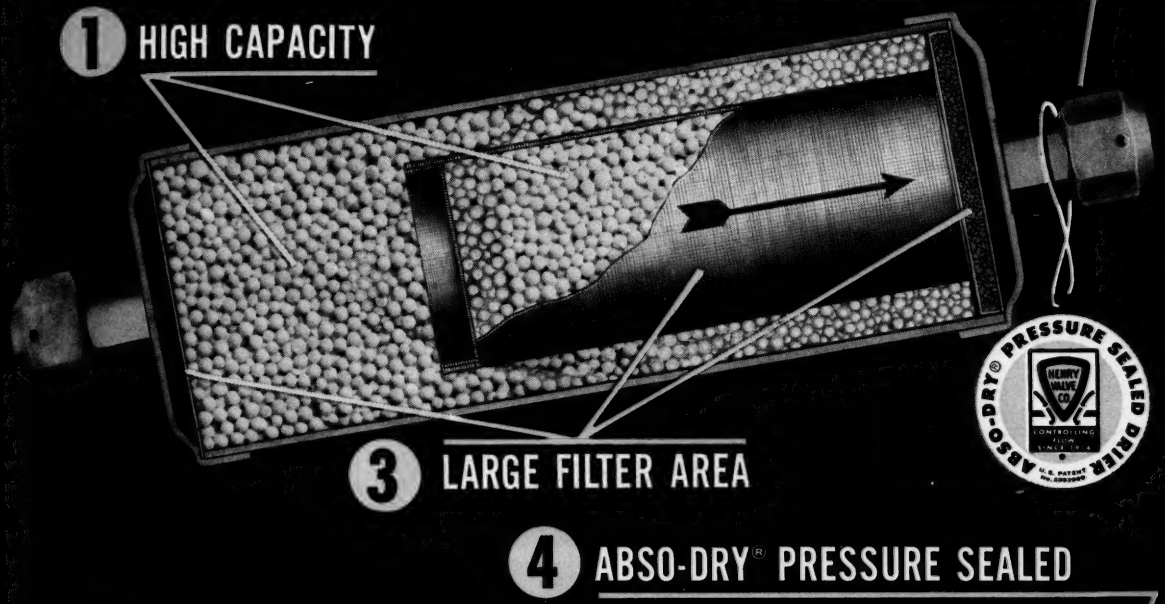
No Postage Stamp Necessary If Mailed in the U. S.

BUSINESS REPLY CARD
FIRST CLASS PERMIT NO. 53, SEC. 34.9, P. L. & R., NEW YORK, N. Y.

AIR CONDITIONING, HEATING AND VENTILATING
93 WORTH STREET
NEW YORK 13, N. Y.

AD-DIGEST SERVICE

This NEW HENRY V200 FILTER-DRIER
Gives You These 5 Advantages


2 LOW PRESSURE DROP
1 HIGH CAPACITY
3 LARGE FILTER AREA
ABSO-DRY® PRESSURE SEALED DRIER
4 ABSO-DRY® PRESSURE SEALED
5 HIGH, 500 P.S.I. WORKING PRESSURE RATING

Reasons Why You'll Like the V200

Filled with H-151 Activated Alumina balls, having very high moisture adsorption capacity with very low pressure drop. H-151 will also effectively pick up acid and remove carbonized oil.

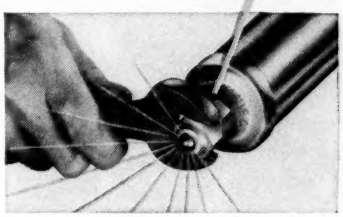
Large filter area and multi-stage filtering through the use of screen cones in smaller sizes and screen cylinders in larger sizes, with glass wool outlet filter element, assure a very high degree of filtration.

To obtain maximum drying efficiency, each filter-drier is thoroughly reactivated. All those furnished with flare connections, by an exclusive patented manufacturing process, provide positive indication by pressure sealing that the drier is tight, dry and factory-fresh.

High working pressure rating, 500 psi, provides necessary safety factor even for use with air-cooled air conditioning systems employing Refrigerant 22.

Steel construction with brass end connections—silver brazed joints—durable molded nylon seal caps.

*"They Hiss and Tell"**



*TRADE-MARK U. S. Patent No. 2283989

When the end connection seal of a new Henry drier is loosened prior to installation, there is a hissing sound due to the escape of dehydrated air.

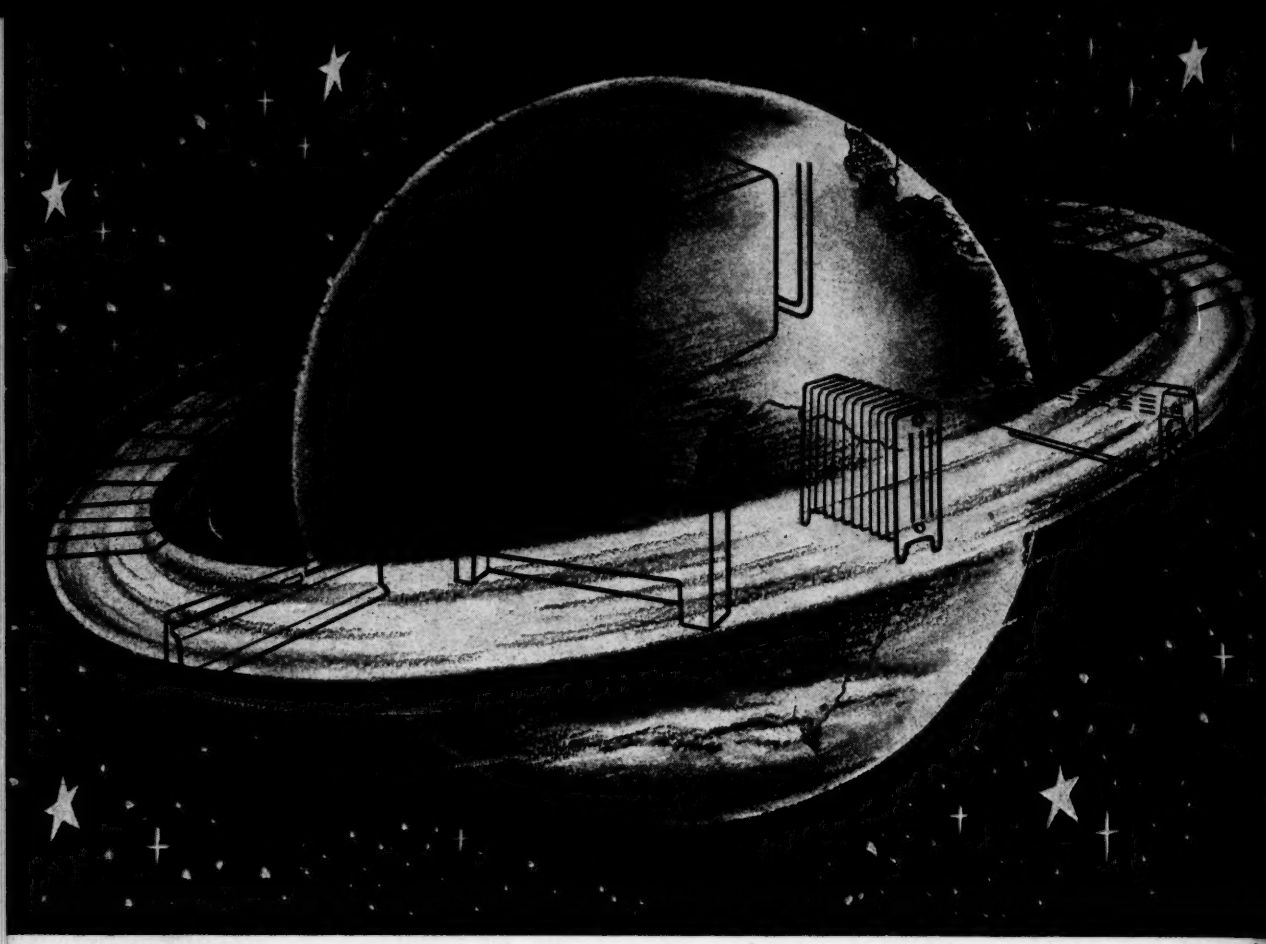
Complete Size Range...

The complete range of types, capacities, and connection sizes permits the selection of the proper Henry drier for any installation.

STOCKED AND SOLD BY LEADING JOBBERS

HENRY VALVE CO.
MELROSE PARK, ILLINOIS (Chicago Suburb)
Cable: Hevalco, Melrose Park, Illinois
VALVES, DRIERS, STRAINERS, AND ACCESSORIES FOR REFRIGERATION, AIR CONDITIONING AND INDUSTRIAL APPLICATIONS

LISTED BY UNDERWRITERS' LABORATORIES, INC. UNDER RE-EXAMINATION SERVICE FOR MAXIMUM WORKING PRESSURE OF 500 P.S.I.



"Hydronics"!*

There is also a wonderful world of ~~thermo-dynamics~~

An automobile ad entreats its readers to "Step into a wonderful world of auto-dynamics!" Their world is all they say it is: wonderful . . . and nothing in it is more "dynamic" than the words they use to describe it. Designs are "glamorous", "glittering", "flight-styled", "exciting." Controls are "feather-touch" or lighter! Engines are "Furies", "Stratostreaks", "Rockets" that release their "hurricanes of power"!

Yes, the great strides of the automotive industry probably justify any extravagance of description. But . . . *please* . . . what about the equally great strides of the industry *you* are dedicated to—the heating industry? There is also a wonderful world of ~~*thermo-dynamics!*~~ *Hydronics*

You well know the recent miracles performed in *that* world. You know that boiler heat, distributed by radiant panels, baseboard units, convectors and modern radiators is the smoothest, most adaptable, most controllable, most economical form of space heating ever known to man.

By introducing heat in its best form—largely radiant form—boiler heat achieves the basic prerequisite of comfort: gentle warming of walls, floors, ceilings. It meets the cold where the cold comes in, as no other system can.

Modulated by modern controls, boiler heat gives an all-encompassing, all-pervading comfort that no other system can rival. Quiet as a moonbeam, it never blasts or calls attention to itself, yet it is always right there with you. Never "all off" or "all on", it provides its even, hold-over flow of cradling warmth that gives the smooth ride even in the bumpiest winter weather . . . does it with the absolute minimum of fuel. It is heat to warm a man's body, heart and soul!

With sturdy, life-time units, boiler heat is the life-time investment. In all deference to the fish-tailed beauties in the garage, heating is still the biggest thing in the home owner's life—day and night for about 200 days of the year.

Let's take our cue from other great industries and quit being so doggone modest in presenting the story of boiler heat. It *is* big. Let's *think* it big . . . *talk* it big . . . *make* it big!

*"Hydronics" is a coined word recently adopted by members of the Institute of Boiler and Radiator Manufacturers to quickly tell the wonderful story of liquid heating and cooling. Its root word, "hydro", is from the Greek word for water, and the second part of the coinage connotes action.

McDonnell & Miller, Inc., 3500 N. Spaulding Ave., Chicago 18, Ill.

Doing One M&M SAFETY CONTROLS *Thing Well*

McDONNELL Boiler Water Level Controls and Safety Devices